VOLUME 7 PART 4

NORTH AMERICAN FLORA

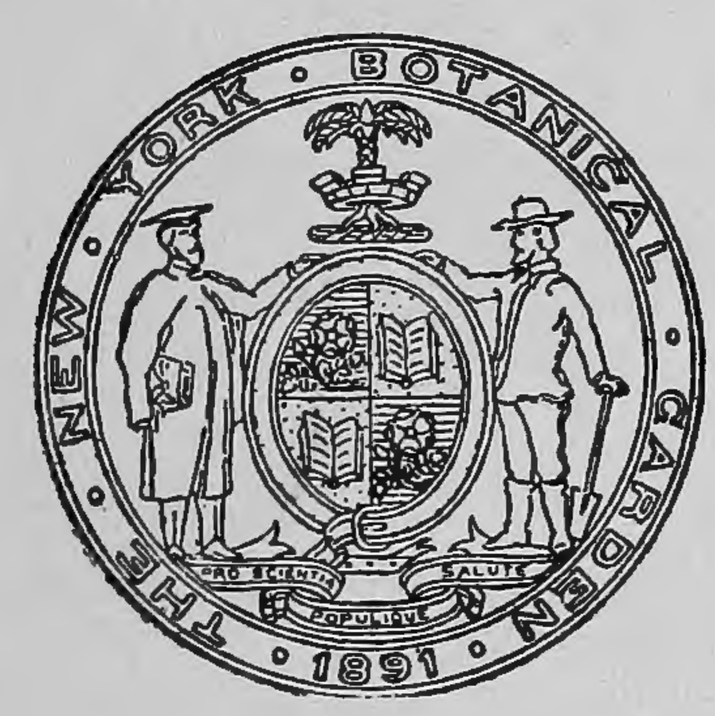
(UREDINALES)

AECIDIACEAE (continuatio)

JOSEPH CHARLES ARTHUR

DICAEOMA ON POACEAE

JOSEPH CHARLES ARTHUR AND FRED. DENTON FROMME



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ANNOUNCEMENT

NORTH AMERICAN FLORA is designed to present in one work descriptions of all plants growing, independent of cultivation, in North America, here taken to include Greenland, Central America, the Republic of Panama, and the West Indies, except Trinidad, Tobago, and Curaçao and other islands off the north coast of Venezuela, whose flora is essentially South American.

The work will be published in parts at irregular intervals, by the New York Botanical Garden, through the aid of the income of the David Lydig Fund bequeathed by Charles P. Daly.

It is planned to issue parts as rapidly as they can be prepared, the extent of the work making it possible to commence publication at any number of points. The completed work will form a series of volumes with the following sequence:

Volume 1. Myxomycetes, Schizophyta.

Volumes 2 to 10. Fungi.

Volumes 11 to 13. Algae.

Volumes 14 and 15. Bryophyta.

Volume 16. Pteridophyta and Gymnospermae.

Volumes 17 to 19. Monocotyledones.

Volumes 20 to 34. Dicotyledones.

The preparation of the work has been referred by the Scientific Directors of the Garden to a committee consisting of Dr. N. L. Britton, Dr. W. A. Murrill, and Dr. J. H. Barnhart.

Professor John M. Coulter, of the University of Chicago; Mr. Frederick V. Coville, of the United States Department of Agriculture; and Professor William Trelease, of the University of Illinois, have consented to act as an advisory committee.

Each author will be wholly responsible for his own contributions, being restricted only by the general style adopted for the work, which must vary somewhat in the treatment of diverse groups.

The subscription price is fixed at $1.50 for each part; it is expected that four or five parts will be required for each volume. A limited number of separate parts will be sold at $2.00 each. Address:

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The species of *Dicaeoma*, now made to include also the species previously placed under *Eriosporangium*, are grouped under the various families of the telial hosts, and the families follow the succession now generally accepted by students of phanerogamic plants.

Uredinia and telia inhabiting monocotyledonous hosts.
- Host belonging to family Poaceae.
  - Telia early or soon naked.
    - Urediniospore-pores basal, placed around the hilum. — 43. *D. Sporoboli.*
    - Urediniospore-pores equatorial.
      - Uredinial paraphyses present.
        - Urediniospore-wall moderately thin (2 μ or less).
          - Urediniospore-wall yellow or colorless.
            - Paraphyses colorless, usually erect. — 20. *D. tubulosum.*
            - Paraphyses usually golden-brown, incurved. — 96. *D. ignavum.*
          - Urediniospore-wall brown.
            - Paraphyses erect.
              - Paraphyses thin-walled, 2–4 μ thick above. — 20. *D. tubulosum.*
              - Paraphyses thick-walled, 7–10 μ thick above.
                - Paraphyses encircling the sori. — 9. *D. Kaernbachii.*
                - Paraphyses intermixed.
                  - Urediniospore-pores 4 or 5; teliopores short, 29–39 μ. — 38. *D. unicum.*
                  - Urediniospore-pores 4; teliospores longer, 39–50 μ. — 8. *D. venustulum.*
            - Paraphyses incurved. — 96. *D. ignavum.*
        - Urediniospore-wall moderately thick (more than 2 μ).
          - Teliospore-wall much thicker above, 5–10 μ. — 5. *D. virgatum.*
          - Teliospore-wall slightly thicker above, 2–3 μ. — 95. *D. melanocephalum.*
      - Uredinial paraphyses absent.
        - Urediniospore-wall moderately thin (2 μ or less).
          - Urediniospore-wall pale-yellow or colorless.
            - Urediniospore-wall thicker above (5–10 μ).
              - Urediniospores medium-sized (up to 35 μ). — 44. *D. verbenicola.*
              - Urediniospores very large (up to 48 μ). — 60. *D. Fraxini.*
            - Urediniospore-wall of uniform thickness.
              - Urediniospore-pores obscure, probably 2. — 34. *D. deformatum.*
              - Urediniospore-pores usually distinct, 4. — 36. *D. poculiforme.*
          - Urediniospore-wall dark-yellow or brown.
            - Urediniospore-wall verrucose.
              - Urediniospore-pores 2 or 3. — 59. *D. Cynodontis.*
              - Urediniospore-pores usually 4, rarely 5. — 27. *D. atrum.*
            - Urediniospore-wall echinulate.
              - Urediniospore-pores 2 or 3, rarely 4.
                - Teliospore-wall thick (2.5–3 μ). — 15. *D. leve.*
                - Teliospore-wall thin (1.5–2 μ). — 18. *D. Huberi.*
              - Urediniospore-pores 3 or 4, rarely 2.
                - Uredinia minute (0.1–0.8 mm. long).
                  - Urediniospores rather large, 26–29 × 27–37 μ. — 14. *D. Arundinellae.*
                  - Urediniospores medium-sized, 15–27 × 20–32 μ. — 20. *D. tubulosum.*
                - Uredinia larger (0.4–3 mm. long).
                  - Urediniospore-pores covered with conspicuously swollen cuticle. — 24. *D. impositum.*
                  - Urediniospore-pores not covered with conspicuously swollen cuticle.
                    - Urediniospores coarsely echinulate. — 22. *D. inclitum.*
                    - Urediniospores finely or somewhat noticeably echinulate.
                      - Urediniospores large (29–45 μ long).
                        - Teliospores slightly thickened at apex (up to 4 μ). — 21. *D. Chaetochloae.*
                        - Teliospores considerably thickened at apex (up to 9 μ). — 46. *D. simulans.*
                      - Urediniospores medium-sized (19–35 μ long).
                        - Teliospores slightly thickened at apex (4–7 μ).
                          - Teliospore-pedicel short (one-half length of spore). — 23. *D. substriatum.*

Teliospore-pedicel long (once to twice length of spore).
Urediniospores ellipsoid or oblong. 32. *D. Arthuri.*
Urediniospores globoid or broadly ellipsoid.
Uredinio-spores rather large, 23–29 × 26–32 μ. 1. *D. Sorghi.*
Uredinio-spores medium-sized, 19–27 × 21–30 μ. 26. *D. Pammelii.*
Teliospores considerably thickened at apex (5–10 μ).
Urediniospores globoid. 25. *D. emaculatum.*
Urediniospores oblong or ellipsoid. 36. *D. poculiforme.*
Urediniospore-wall moderately thick (more than 2 μ). 39. *D. interveniens.*
Urediniospore-wall pale-yellow or colorless.
Urediniospore-wall dark-yellow or brown.
Urediniospore-wall verrucose.
Urediniospores rather small (19–26 μ long).
Urediniospore-pores 3 or 4. 6. *D. Mariae-Wilsoni.*
Urediniospore-pores 4–6. 48. *D. Sarcobati.*
Urediniospore-pores 2 or 3. 59. *D. Cynodontis.*
Urediniospores medium-sized (24–32 μ long).
Teliospores small (28–35 μ long). 10. *D. infuscans.*
Teliospores medium-sized (33–48 μ long). 73. *D. Redfieldiae.*
Urediniospores rather large (24–39 μ long).
Urediniospore-pores 2 or 3. 17. *D. Anthephorae.*
Urediniospore-pores 4–6. 28. *D. eslavense.*
Urediniospore-wall echinulate.
Urediniospores globoid or broadly ellipsoid.
Urediniospores medium-sized (19–21 × 23–26 μ). 77. *D. Zeugitis.*
Urediniospores rather large (24–30 × 27–34 μ).
Urediniospore-pores 2. 45. *D. egenulum.*
Urediniospore-pores 3 or 4.
Teliospores medium-sized (35–50 μ long). 4. *D. Ceanothi.*
Teliospores rather large (47–77 μ long). 94. *D. Arundinariae.*
Urediniospores ellipsoid or oblong; pores 4, sometimes 5.
Urediniospore-wall moderately thick, 2–2.5 μ.
Urediniospores ellipsoid. 46. *D. simulans.*
Urediniospores oblong. 36. *D. poculiforme.*
Urediniospore-wall very thick (3–4 μ). 70. *D. rubellum.*
Urediniospore-pores scattered.
Uredinial paraphyses present.
Urediniospore-wall moderately thin (2 μ or less).
Urediniospores medium-sized (not more than 29 μ long). 51. *D. Triniochloae.*
Urediniospores large (up to 42 μ long). 71. *D. Magnusianum.*
Urediniospore-wall moderately thick (up to 2.5 μ). 12. *D. purpureum.*
Uredinial paraphyses absent.
Urediniospore-wall moderately thin (2 μ or less).
Urediniospore-wall pale-yellow or colorless.
Urediniospore-wall thicker above. 63. *D. Chloridis.*
Urediniospore-wall of uniform thickness.
Teliospores usually not thickened above.
Urediniospore-wall verrucose. 48. *D. Sarcobati.*
Urediniospore-wall echinulate. 69. *D. kansense.*

Teliospores noticeably thickened above (3–10 μ).
Teliospores with digitate projections at apex. — 58. *D. Periclymeni.*
Teliospores smooth at apex.
Urediniospores medium-sized (18–25 × 21–29 μ).
Teliospores small (25–29 μ long). — 64. *D. exasperans.*
Teliospores medium-sized (35–64 μ long). — 40. *D. Stipae.*
Urediniospores rather large (23–29 × 28–35 μ). — 19. *D. macrum.*
Urediniospore-wall dark-yellow or brown.
Urediniospores of the modified sort (amphispores) present.
Teliospores with septum often vertical or oblique. — 65. *D. Boutelouae.*
Teliospores with septum horizontal. — 41. *D. scaber.*
Urediniospores of the modified sort unknown.
Urediniospore-wall verrucose.
Teliospores often 1-celled (mesospores). — 48. *D. Sarcobati.*
Teliospores usually uniformly 2-celled. — 72. *D. Windsoriae.*
Urediniospore-wall echinulate.
Teliospores with septum often vertical or oblique.
Teliospores medium-sized (26–48 μ long). — 29. *D. flaccidum.*
Teliospores smaller (24–32 μ long).
Teliospore-wall thin (1–1.5 μ). — 13. *D. Aegopogonis.*
Teliospore-wall moderately thick (2–2.5 μ). — 50. *D. dochmium.*
Teliospores with septum horizontal.
Urediniospores ellipsoid.
Teliospores germinating at maturity. — 55. *D. monoicum.*
Teliospores germinating after a resting period. — 47. *D. luxuriosum.*
Urediniospores globoid or nearly so.
Urediniospores rather small (15–19 × 18–22 μ). — 42. *D. micranthum.*
Urediniospores medium-sized (18–26 × 19–29 μ).
Urediniospore-pores 3–6. — 7. *D. Andropogonis.*
Urediniospore-pores 6–8.
Teliospores rather small (up to 48 μ long). — 49. *D. hibisciatum.*
Teliospores medium-sized (up to 56 μ long). — 52. *D. amphigenum.*
Urediniospore-wall moderately thick (more than 2 μ).
Urediniospore-wall pale-yellow or colorless.
Teliospore-wall not thickened above.
Teliospore-wall longitudinally striate. — 83. *D. Pattersonianum.*
Teliospore-wall verrucose. — 78. *D. paradoxicum.*
Teliospore-wall thickened above, smooth.
Urediniospore-wall moderately thick (2–2.5 μ). — 80. *D. abundans.*
Urediniospore-wall very thick (3–4 μ). — 61. *D. Distichlidis.*
Urediniospore-wall brown.
Urediniospores of the modified sort (amphispores) present. — 66. *D. vexans.*
Urediniospores of the modified sort unknown.
Urediniospore-wall echinulate. — 49. *D. hibisciatum.*
Urediniospore-wall verrucose.
Urediniospores medium-sized (18–24 μ wide).
Teliospores 3–7 μ thick above. — 68. *D. Leptochloae.*
Teliospores 6–12 μ thick above. — 48. *D. Sarcobati.*
Urediniospores rather large (26–29 μ wide). — 30. *D. Setariae.*
Urediniospore-pores, or urediniospores, rarely seen or unknown.
Urediniospores unknown. — 56. *D. leptosporum.*
Urediniospores known but pores obscure.
Uredinial paraphyses present.
Paraphyses medium-sized (10–15 × 29–50 μ). — 20. *D. tubulosum.*
Paraphyses large (10–29 × 58–98 μ). — 51. *D. Triniochloae.*
Uredinial paraphyses absent.
Urediniospore-wall thickened above. — 62. *D. Cephalanthi.*

Urediniospore-wall irregularly thickened. 11. *D. versicolor.*
Urediniospore-wall of uniform thickness, thin. 67. *D. Jamesianum.*
Telia long covered by the epidermis.
Urediniospore-pores equatorial.
Urediniospore-pores 2.
Paraphyses wanting; urediniospore-wall 2–3 μ thick. 33. *D. Cenchri.*
Paraphyses present; urediniospore-wall 1–1.5 μ thick. 35. *D. phakopsoroides.*
Urediniospore-pores 4.
Paraphyses wanting; urediniospores colorless. 2. *D. pallescens.*
Paraphyses present.
Urediniospores brown. 16. *D. Chaseanum.*
Urediniospores colorless. 96. *D. ignavum.*
Urediniospore-pores 5. 3. *D. polysorum.*
Urediniospore-pores scattered or obscure.
Uredinial paraphyses present.
Teliospores unknown. 96. *D. ignavum.*
Teliospores with digitate projections at apex.
Teliospores small (10–16 × 27–45 μ), with low projections. 93. *D. subdigitatum.*
Teliospores medium-sized (13–19 × 30–61 μ), with prominent projections.
Projections 3–12 μ long, spreading. 57. *D. Rhamni.*
Projections 10–25 μ long, erect. 58. *D. Periclymeni.*
Teliospores with smooth apex.
Paraphyses numerous.
Paraphyses thin-walled, 1 μ. 85. *D. montanense.*
Paraphyses thick-walled, 2–4 μ.
Paraphyses variously bent and incurved.
Teliospores 2-celled. 79. *D. epiphyllum.*
Teliospores 1–3-celled. 35. *D. phakopsoroides.*
Paraphyses mostly erect and irregular.
Teliospores large, 45–64 μ long. 75. *D. Koeleriae.*
Teliospores smaller, 29–51 μ long. 53. *D. pygmaeum.*
Paraphyses few, the wall rather thin, 1.5 μ.
Teliospores broad (18–34 μ). 85. *D. montanense.*
Teliospores narrow (10–24 μ).
Urediniospores medium-sized, 19–32 μ long.
Urediniospore-pores 6–8. 88. *D. Clematidis.*
Urediniospore-pores 10–15. 90. *D. glumarum.*
Urediniospores small, 16–24 μ long. 89. *D. Impatientis.*
Uredinial paraphyses absent.
Urediniospore-wall moderately thick (more than 2 μ). 84. *D. procerum.*
Urediniospore-wall moderately thin (2 μ or less).
Urediniospore-wall pale-yellow or colorless.
Teliospores with digitate projections at apex.
Teliospores small (10–16 × 27–45 μ), with low projections. 93. *D. subdigitatum.*
Teliospores medium-sized (13–19 × 30–61 μ), with prominent projections. 57. *D. Rhamni.*
Teliospores with smooth apex.
Teliospores rather narrow (10–18 μ).
Telia bordered by stromal hyphae.
Urediniospores small (16 – 24 μ long). 89. *D. Impatientis.*
Urediniospores medium-sized (19–32 μ long).
Urediniospore-pores 6–8. 88. *D. Clematidis.*
Urediniospore-pores 10–15. 90. *D. glumarum.*
Telia not bordered by stromal hyphae.
Teliospores 1–3-celled. 2. *D. pallescens.*
Teliospores 2-celled.
Teliospores small (10–16 × 32 –39 μ). 31. *D. Cameliae.*
Teliospores large (13–21 × 50 –85 μ). 81. *D. Cockerellianum.*
Teliospores moderately broad (15–21 μ or more).
Teliospores often 1-celled (mesospores).
Teliospore-wall moderately thin (1.5 μ). 92. *D. anomalum.*
Teliospore-wall moderately thick (1.5–2.5 μ). 82. *D. Piperi.*
Teliospores usually uniformly 2-celled.
Urediniospores rather small (15–18 × 19–24 μ).
Uredinia cinnamon-brown. 74. *D. Eatoniae.*
Uredinia yellow. 87. *D. apocryptum.*

Urediniospores medium-sized (16–26 × 19–30 μ).
Teliospores 13–24 μ broad.
Teliospore-wall thin, 1 μ. 90. *D. glumarum.*
Teliospore-wall rather thick, 1.5–2.5 μ. 91. *D. Hordei.*
Teliospores 16–29 μ broad. 76. *D. Liatridis.*
Urediniospore-wall dark-yellow or brown.
Teliospores rather narrow (13–24 μ).
Uredinia usually reddish-brown. 86. *D. Asperifolii.*
Uredinia usually light yellowish-brown. 88. *D. Clematidis.*
Teliospores rather broad (18–34 μ).
Urediniospore-pores 6–8.
Urediniospore-wall thin (1–1.5 μ). 54. *D. holcinum.*
Urediniospore-wall moderately thin (1.5–2 μ). 37. *D. Majanthae.*
Urediniospore-pores 8–10. 85. *D. montanense.*
Host belonging to family Cyperaceae.
Urediniospore-pores equatorial.
Urediniospores with 2 pores (in occasional spores 3).
Urediniospore-wall moderately thin (1–2 μ).
Uredinia tardily naked.
Urediniospores small or medium-sized (13–24 × 18–35 μ).
Telia surrounded by a stroma.
Telia usually raised above the leaf-surface. 97. *D. obtectum.*
Telia not or only slightly raised above the leaf-surface. 102. *D. canaliculatum.*
Telia not surrounded by a stroma.
Telia tardily naked.
Urediniospores medium-sized (16–21 × 24–32 μ). 98. *D. Scirpi.*
Urediniospores small (13–21×18–27 μ). 108. *D. libertum.*
Telia moderately early naked. 100. *D. angustatum.*
Urediniospores rather large (18–26 × 27–37 μ). 109. *D. incompositum.*
Uredinia early naked.
Urediniospores of the modified sort (amphispores) unknown. 121. *D. Caricis-polystachyae.*
Urediniospores of the modified sort (amphispores) with chestnut-brown wall, thicker above. 122. *D. atrofuscum.*
Urediniospore-wall moderately thick (1.5–2.5 μ or more).
Urediniospore-wall of uniform thickness.
Urediniospores medium-sized (16–23 × 23–32 μ).
Urediniospore-wall finely verrucose-echinulate. 111. *D. fuirenicola.*
Urediniospore-wall moderately echinulate. 120. *D. consobrinum.*
Urediniospores very large (26–37 × 35–61 μ). 123. *D. macrosporum.*
Urediniospore-wall frequently thicker above. 104. *D. Cyperi-tageliformis.*
Urediniospores with 3 pores (in occasional spores 4).
Urediniospore-wall thin (1.5 μ or less).
Teliospores 1–4-celled, chiefly 3-celled. 112. *D. Scleriae.*
Teliospores uniformly 2-celled.
Teliospores with apex slightly thickened (1.5–3 μ). 106. *D. antioquiense.*
Teliospores with apex considerably thickened (3–5 μ). 105. *D. abreptum.*
Urediniospore-wall moderately thick (1.5 μ or more).
Uredinia tardily naked.
Urediniospore-wall light-yellow. 117. *D. Dichromenae.*
Urediniospore-wall brown.
Urediniospores medium-sized (15–21 × 19–24 μ). 128. *D. Grossulariae.*
Urediniospores large (16–26 × 22–39 μ).
Teliospore-wall moderately thick (2–2.5 μ). 110. *D. Fuirenae.*
Teliospore-wall moderately thin (1–1.5 μ).
Teliospores large (35–77 μ long).
Telia somewhat tardily naked. 103. *D. Cyperi.*
Telia rather soon naked. 99. *D. McClatchieanum.*
Teliospores small (26–42 μ long). 124. *D. minutum.*
Uredinia early naked.
Urediniospores medium-sized (15–21 × 19–32 μ).
Teliospores moderately small (32–45 μ long).
Urediniospore-wall cinnamon-brown, sparsely echinulate. 125. *D. Lysimachiae.*
Urediniospore-wall light chestnut-brown, moderately echinulate. 126. *D. Parnassiae.*
Teliospores medium-sized (32–58 μ long). 128. *D. Grossulariae.*
Teliospores large (45–67 μ long). 127. *D. eminens.*
Urediniospores large (18–29 × 24–39 μ).

Urediniospore-wall 1.5–2 μ thick. 129. *D. Urticae.*
Urediniospore-wall 2–2.5 μ thick. 130. *D. spatiosum.*
Urediniospores with 4 pores (in occasional spores 3, or rarely 5).
Urediniospore-wall moderately thin (1.5 μ or less).
Uredinia tardily naked.
Urediniospore-wall pale-yellow.
Teliospore-wall cinnamon-brown, much thickened above (3–6 μ). 113. *D. scleriicola.*
Teliospore-wall pale-yellow, somewhat thickened above (2–4 μ). 131. *D. microsorum.*
Urediniospore-wall cinnamon-brown. 107. *D. Eleocharidis.*
Uredinia early naked. 121. *D. Caricis-polystachyae.*
Urediniospore-wall moderately thick (2–2.5 μ). 114. *D. Cladii.*
Urediniospore-pores in an extra-equatorial zone.
Urediniospores with 2 pores above the equator.
Urediniospore-pores slightly above the equator.
Uredinia tardily naked. 100. *D. angustatum.*
Uredinia early naked.
Urediniospores small (12–18 × 16–21 μ). 132. *D. minutissimum.*
Urediniospores medium-sized (15–20 × 20–26 μ). 133. *D. Dracunculi.*
Urediniospore-pores considerably above the equator.
Urediniospore-wall thick (3–4 μ). 116. *D. superius.*
Urediniospore-wall moderately thin (2 μ or less).
Uredinia tardily naked.
Urediniospores globoid, obovoid, or ellipsoid.
Telia surrounded by stroma. 115. *D. Fimbristylidis.*
Telia not surrounded by stroma.
Urediniospores medium-sized (19–26 × 23–29 μ). 101. *D. Eriophori.*
Urediniospores small (12–19 × 16–23 μ). 135. *D. Asterum.*
Urediniospores flattened laterally. 118. *D. Rosenii.*
Uredinia early naked.
Urediniospores small (12–19 × 16–23 μ).
Teliospores small (29–35 μ long). 134. *D. Phrymae.*
Teliospores medium-sized (30–50 μ or more long). 135. *D. Asterum.*
Urediniospores medium-sized (15–20 × 19–26 μ).
Telia roundish or oval, comparatively broad; teliospores usually 14–18 μ broad. 136. *D. Peckii.*
Telia oblong or linear, comparatively narrow; teliospores usually 16–21 μ broad. 137. *D. hieraciatum.*
Urediniospores moderately large (16–23 × 23–32 μ).
Urediniospores ellipsoid or obovoid. 119. *D. angustatoides.*
Urediniospores chiefly lenticular. 138. *D. Sambuci.*
Urediniospores with 1 or 2 pores, below the equator.
Pores 2, slightly below the equator (subequatorial). 139. *D. Caricis-strictae.*
Pores 1, near the hilum. 128. *D. Grossulariae.*
Urediniospore-pores scattered. 140. *D. Trientalis.*
Host belonging to family Bromeliaceae. 141. *D. Pitcairniae.*
Host belonging to family Commelinaceae. 142. *D. Commelinae.*
Host belonging to family Juncaceae. 143. *D. obscurum.*
Host belonging to family Melanthaceae.
Urediniospores with 1 pore; teliospores verrucose. 144. *D. Veratri.*
Urediniospores with 2 or more pores; teliospores smooth.
Urediniospores with 2 pores. 145. *D. atropunctum.*
Urediniospores with 5–10 pores. 146. *D. grumosum.*
Host belonging to family Alliaceae.
Urediniospores with 4–8 pores. 147. *D. mutabile.*
Urediniospores with 8–15 pores.
Urediniospores 20–26 × 23–32 μ.
Urediniospore-pores indistinct, even in lactic acid. 148. *D. Allii.*
Urediniospores usually distinct. 149. *D. Porri.*
Urediniospores 23–32 × 28–39 μ, the pores distinct.
Teliospores smooth. 150. *D. granulisporum.*
Teliospores tuberculate. 151. *D. nodosum.*
Host belonging to family Convallariaceae. 152. *D. Asparagi.*
Host belonging to family Smilacaceae. 153. *D. Smilacis.*
Host belonging to family Amaryllidaceae.
Urediniospore-pores 2, superequatorial. 154. *D. Aletridis.*
Urediniospore-pores inconspicuous; telia pulverulent. 155. *D. Cooperiae.*
Urediniospore-pores obscure.
Telia brown, compact, long covered. 156. *D. Bomareae.*
Telia white, somewhat pulverulent, early naked. 157. *D. Pallor.*
Host belonging to family Iridaceae.
Urediniospores with 3 or 4 pores. 158. *D. Iridis.*
Urediniospores with 8 or 9 pores. 159. *D. angulatum.*

Host belonging to family Cannaceae.	160. *D. Cannae.*
Host belonging to family Marantaceae.	160. *D. Cannae.*
Host belonging to family Orchidaceae.	161. *D. Cypripedii.*
Uredinia and telia inhabiting dicotyledonous hosts.	
Host belonging to family Polygonaceae.	
Urediniospore-pores 2, occasionally 3, distinct.	
Urediniospore-wall thin, 1–1.5 μ.	162. *D. Polygoni-amphibii.*
Urediniospore-wall moderately thick, 1.5–2.5 μ.	169. *D. Acetosae.*
Urediniospore-pores 3 or more, often indistinct.	
Teliospores with colorless papillae over the pores.	
Teliospore-papillae 1.5–2 μ.	168. *D. Polygoni-alpini.*
Teliospore-papillae 3–5 μ.	
Teliospores broad, 18–23 μ.	165. *D. amphispilusum.*
Teliospores narrow, 13–19 μ.	
Urediniospore-wall 1 μ or more, brown.	166. *D. Sommerfeltii.*
Urediniospore-wall 1 μ or less, yellow.	167. *D. parcum.*
Teliospores without papillae over the pores.	
Teliospore-wall uniform in thickness.	
Teliospores small, 15–19 × 20–28 μ.	163. *D. Polygoni-vivipari.*
Teliospores larger, 16–21 × 24–35 μ.	164. *D. Bistortae.*
Teliospore-wall thicker at apex, 5–9 μ.	
Teliospores smooth.	170. *D. punctiforme.*
Teliospores verrucose-rugose.	171. *D. Oxyriae.*
Host belonging to family Amaranthaceae.	
Urediniospores small, 16–19 × 19–23 μ.	172. *D. Guillemineae.*
Urediniospores larger, 18–26 × 23–34 μ.	
Urediniospores obliquely rugose.	173. *D. striolatum.*
Urediniospores echinulate.	174. *D. obesisporum.*
Host belonging to family Petiveriaceae.	175. *D. Rivinae.*
Host belonging to family Alsinaceae.	
Urediniospores verrucose; teliospore-wall thick, 3–5 μ.	176. *D. modicum.*
Urediniospores echinulate; teliospore-wall thin, 1.5–2.5 μ.	177. *D. tardissimum.*
Host belonging to family Ranunculaceae.	
Urediniospores with 2 pores, rarely 3.	
Teliospores 15–22 μ broad, mostly ellipsoid.	178. *D. Calthae.*
Teliospores 20–34 μ broad, mostly oblong.	179. *D. areolatum.*
Urediniospores with 3 pores, rarely 2; teliospores 23–30 μ broad.	180. *D. calthaecola.*
Host belonging to family Fabaceae.	181. *D. Ormosiae.*
Host belonging to family Oxalidaceae.	182. *D. Oxalidis.*
Host belonging to family Balsaminaceae.	183. *D. Nolitangeris.*
Host belonging to family Violaceae.	184. *D. Violae.*
Host belonging to family Onagraceae.	185. *D. Epilobii-tetragoni.*
Host belonging to family Haloragidaceae.	186. *D. Proserpinacae.*
Host belonging to family Ammiaceae.	
Urediniospores 29–37 μ long.	191. *D. Arracacharum.*
Urediniospores less than 32 μ long.	
Urediniospore-wall thick, 2–4 μ.	190. *D. marylandicum.*
Urediniospore-wall thinner, 2.5 μ or less.	
Teliospores smooth.	192. *D. obscuratum.*
Teliospores rough.	
Teliospores reticulate.	187. *D. Pimpinellae.*
Teliospores verrucose or rugose.	
Teliospore-wall thin, 1–1.5 μ	188. *D. Pseudocymopteri.*
Teliospore-wall rather thick, 1.5–2.5 μ.	189. *D. Cicutae.*
Host belonging to family Primulaceae.	193. *D. Ortonii.*
Host belonging to family Gentianaceae.	194. *D. Gentianae.*
Host belonging to family Convolvulaceae.	
Urediniospore-wall thick, 2–3 μ.	
Echinulations rather fine, 2–3 μ apart.	195. *D. Convolvuli.*
Echinulations prominent, 4–6 μ apart.	196. *D. jalapense.*
Urediniospore-wall thin, 1.5–2 μ.	
Urediniospores 21–26 μ broad; teliospore-wall 7–15 μ at apex.	197. *D. Lithospermi.*
Urediniospores 27–33 μ broad; teliospore-wall 3 μ or less at apex.	198. *D. Cressae.*
Host belonging to family Polemoniaceae.	
Urediniospore-wall finely and inconspicuously echinulate.	199. *D. Giliae.*
Urediniospore-wall rather coarsely and conspicuously echinulate.	200. *D. fumosum.*
Host belonging to family Boraginaceae.	201. *D. Cryptanthes.*
Host belonging to family Lamiaceae.	
Teliospore-wall thin, 1 μ or less, usually colorless or pale cinnamon-brown.	
Teliospore-wall uniform in thickness.	
Teliospores 30–35 μ long.	208. *D. medellinense.*
Teliospores more than 45 μ long.	
Teliospores narrowly ellipsoid (16–24 × 48–55 μ).	210. *D. insititium.*
Teliospores fusiform or lance-oblong (15–19 × 45–70 μ).	

Urediniospore-pores equatorial. 207. *D. Hyptidis.*
Urediniospore-pores near hilum. 209. *D. fidele.*
Teliospore-wall thickened at apex.
Urediniospore-pores 4 or 5, basal. 205. *D. Leonotidis.*
Urediniospore-pores 2–4, equatorial.
Teliospores 14–21 μ wide. 211. *D. Hyptidis-mutabilis.*
Teliospores 20–27 μ wide. 206. *D. fuscatum.*
Teliospore-wall thicker, more than 1 μ, light- or dark-brown.
Teliospore-wall uniform in thickness. 216. *D. badium.*
Teliospore-wall thickened above.
Teliospores mostly less than 35 μ long.
Urediniospore-wall dark above, lighter below. 217. *D. diutinum.*
Urediniospore-wall concolorous.
Urediniospore-wall pale-yellow.
Teliospores conspicuously tuberculate. 204. *D. Monardellae.*
Teliospores moderately verrucose.
Urediniospores globoid or ellipsoid (16–22 × 20–26 μ). 202. *D. Menthae.*
Urediniospores obovoid or ellipsoid (16–22 × 22–29 μ). 203. *D. Micromeriae.*
Urediniospore-wall cinnamon-brown.
Urediniospore-pores 4 or 5, around hilum. 205. *D. Leonotidis.*
Urediniospore-pores 2 or 3, usually subequatorial.
Teliospore-wall dark cinnamon-brown, 1–2 μ thick. 218. *D. infrequens.*
Teliospore-wall chestnut-brown, 2–3 μ thick. 214. *D. farinaceum.*
Teliospores mostly more than 35 μ long.
Teliospores usually less than 24 μ wide. 212. *D. caulicola.*
Teliospores more than 24 μ wide.
Urediniospore-pores 3 or 4, scattered. 215. *D. Ballotaeflorae.*
Urediniospore-pores 2 or 3, equatorial or subequatorial.
Teliospore-wall thick, 3–6 μ, at apex 7–10 μ.
Teliospores inconspicuously verrucose. 213. *D. salviicola.*
Teliospores usually coarsely verrucose.
Urediniospores 16–21 μ wide. 219. *D. mitratum.*
Urediniospores 21–26 μ wide. 220. *D. gentile.*
Teliospore-wall thinner, 3.5 μ or less, at apex 5–7 μ.
Teliospores oblong or ellipsoid (23–29 × 35–51 μ). 222. *D. filiolum.*
Teliospores broadly ellipsoid (27–32 × 35–40 μ). 221. *D. prosperum.*
Host belonging to family Acanthaceae.
Teliospores smooth. 225. *D. varium.*
Teliospores rough.
Teliospore-wall uniform in thickness, 2–3.5 μ. 224. *D. Ruelliae.*
Teliospore-wall 3–5 μ thick, at apex 6–11 μ.
Teliospores 35–42 μ long. 226. *D. Tetramerii.*
Teliospores 39–48 μ long. 223. *D. Anisacanthi.*
Host belonging to family Rubiaceae.
Urediniospore-pores equatorial. 228. *D. troglodytes.*
Urediniospore-pores superequatorial.
Urediniospore-wall thick, 2–3 μ. 229. *D. eximium.*
Urediniospore-wall thinner, 1.5–2 μ. 227. *D. punctatum.*
Host belonging to family Ambrosiaceae.
Urediniospore-pores 2, equatorial; teliospore-wall 2.5–5 μ thick. 230. *D. splendens.*
Urediniospore-pores 2 or 3, subequatorial; teliospore-wall 1.5–2.5 μ thick. 231. *D. Xanthiifoliae.*
Host belonging to family Carduaceae.
Teliospore-wall colorless or light cinnamon-brown, thin.
Teliospores smooth.
Teliospores mostly more than 50 μ long.
Teliospore-wall uniformly thick.
Urediniospores small, less than 25 μ long. 232. *D. Becki.*
Urediniospores large, more than 25 μ long.
Teliospores mostly more than 58 μ long. 233. *D. erraticum.*
Teliospores mostly less than 58 μ long.
Teliospores 19–26 μ broad. 234. *D. fraternum.*
Teliospores 16–19 μ broad. 252. *D. inauditum.*
Teliospore-wall thickened above.
Teliospore-wall 10–15 μ thick at apex. 253. *D. Oyedaeae.*
Teliospore-wall 3–6 μ thick at apex.
Pedicels slender. 239. *D. evadens.*
Pedicels inflated. 240. *D. Baccharidis.*
Teliospores less than 50 μ long.

Telia smooth and usually polished. 241. *D. pistoricum.*
Telia velvety, often cinereous by germination.
Teliospore-wall thick, more than 2 μ. 242. *D. sphenicum.*
Teliospore-wall thin, less than 2 μ.
Telia low, applanate. 243. *D. exornatum.*
Telia prominent, pulvinate. 244. *D. oaxacanum.*
Teliospores minutely verrucose or punctate.
Teliospores with thin concolorous umbo. 237. *D. Baccharidis-hirtellae.*
Teliospores with pale umbo. 238. *D. egressum.*
Teliospore-wall chestnut- or chocolate-brown.
Teliospore-wall smooth.
Teliospore-wall not more than 7 μ thick above.
Teliospores narrow, usually less than 24 μ broad. 250. *D. Helianthellae.*
Teliospores wider, usually more than 24 μ broad.
Urediniospore-pores 3 (rarely 2 or 4), with bullate swelling over pores. 260. *D. Cnici.*
Urediniospore-pores 2, without noticeable swelling over pores.
Urediniospores noticeably flattened laterally, the pores extra-equatorial. 246. *D. Gymnolomiae.*
Urediniospores not noticeably flattened, the pores equatorial.
Telia early naked. 254. *D. Verbesinae.*
Telia long covered by epidermis. 255. *D. irregulare.*
Teliospore-wall more than 7 μ thick above.
Teliospores typically rounded below.
Teliospore-wall moderately thin, 1.5–3 μ.
Urediniospores (with pores in optical section) triangular, 20–26 μ long. 245. *D. aemulans.*
Urediniospores (with pores in optical section) oblong-ovate, 23–34 μ long. 248. *D. Helianthi-mollis.*
Teliospore-wall thick, 3–5 μ.
Urediniospore-wall thin, 1–1.5 μ. 249. *D. massale.*
Urediniospore-wall moderately thick, 1.5–3 μ.
Urediniospores sparsely echinulate. 247. *D. Caleae.*
Urediniospores moderately echinulate. 258. *D. abruptum.*
Teliospores typically narrowed below.
Pedicel cinnamon-brown. 259. *D. senecionicola.*
Pedicel colorless.
Teliospore-wall laminate. 257. *D. invelatum.*
Teliospore-wall not noticeably laminate. 256. *D. cognatum.*
Teliospore-wall rough.
Paraphyses in the uredinia; teliospore-wall tuberculate. 236. *D. ratum.*
Paraphyses not associated with uredinia.
Urediniospore-wall colorless; teliospore-wall verrucose. 235. *D. nothum.*
Urediniospore-wall cinnamon- or chestnut-brown.
Teliospore-wall prominently verrucose. 251. *D. Zexmeniae.*
Teliospore-wall inconspicuously verrucose or verrucose-rugose. 260. *D. Cnici.*
Host belonging to family Cichoriaceae.
Urediniospore-pores 2 (rarely 3), equatorial or superequatorial.
Urediniospore-wall thin, 1.5 μ or less.
Urediniospores small, 15–20 × 17–22 μ. 261. *D. Lapsanae.*
Urediniospores larger, 19–26 × 23–29 μ. 262. *D. Harknessii.*
Urediniospore-wall thicker, 1.5 μ or more.
Urediniospores large, 24 × 29 μ or more. 263. *D. Stephanomeriae.*
Urediniospores smaller, 24 × 29 μ or less.
Aeciospores rather large, 20 × 25 μ or less. 264. *D. variabile.*
Aeciospores smaller, 19 × 23 μ or less. 266. *D. insperatum.*
Urediniospore-pores 3–6 (rarely 2), equatorial or indefinite.
Urediniospores rather small, 20–24 μ long. 268. *D. proximelium.*
Urediniospores larger, 23–33 μ long.
Urediniospore-wall moderately thick, 1.5–3 μ. 265. *D. Orbicula.*
Urediniospore-wall thinner, 1–2 μ.
Teliospore-walls uniformly thick, 1.5 μ. 267. *D. hemisphaericum.*
Teliospore-walls 1.5–2.5 μ, thicker over germ-pores. 269. *D. Crepidis-montanae.*

1. * **Dicaeoma Sorghi** (Schw.) Kuntze, Rev. Gen. **3**[3]: 470. 1898.

Puccinia Sorghi Schw. Trans. Am. Phil. Soc. II. **4**: 295. 1832.
Uredo Zeae Desmaz. Ann. Sci. Nat. II. **13**: 182. 1840. Not *U. Zeae* Schw. 1822.
Puccinia Maydis Bérenger, Atti Sci. Ital. **6**: 475, hyponym. 1845. Not *Uredo Maydis* DC. 1815.
Puccinia Zeae Bérenger; Klotzsch, Herb. Viv. Myc. Suppl. *18*. 1851.
Trichobasis Maydis Niessl, Abh. Nat. Ver. Brünn **3**: 114. 1865.
Aecidium Oxalidis Thüm. Flora **59**: 425. 1876.
Aecidium Peyritschianum Magnus, Ber. Nat.-Med. Ver. Innsbruck **21**: 34. 1894.

O. Pycnia amphigenous, few, in small groups or intermixed with the aecia, honey-yellow becoming brownish, rather inconspicuous, globoid, 90–110 μ in diameter; ostiolar filaments short.

* Species of *Dicaeoma* on Poaceae in collaboration with FRED DENTON FROMME.

I. Aecia hypophyllous, in small circular groups 2–3 mm. broad, cupulate, small, 0.2–0.3 mm. in diameter; peridium colorless, rather fragile, the margin erect, irregularly lacerate or entire; peridial cells oblong, 15–18 by 23–32 μ, abutted or slightly overlapping, the outer wall smooth, finely striate, 7–10 μ thick, the inner wall verrucose, 2–2.5 μ thick; aeciospores globoid or ellipsoid, 13–19 by 18–26 μ; wall pale-yellow, about 1.5 μ thick, very finely and closely verrucose.

ON OXALIDACEAE:
Ionoxalis violacea (L.) Small (*Oxalis violacea* L.), Kansas, Nebraska.
Xanthoxalis filipes Small (*Oxalis filipes* Small), Oklahoma.
Xanthoxalis Langloisii Small, Texas.
Xanthoxalis stricta (L.) Small (*X. interior* Small, *Oxalis stricta* L., *O. corniculata stricta* Sav., *O. cymosa* Small), Indiana, Iowa, Kansas, Nebraska, North Dakota, South Dakota.

II. Uredinia amphigenous, scattered or in groups, sometimes forming lines, elliptic or oblong, 0.5–1 mm. long, or much longer in warm, moist regions, tardily naked, cinnamon-brown, pulverulent, ruptured epidermis prominent; urediniospores broadly ellipsoid or globoid, 23–29 by 26–32 μ; wall moderately thin, 1.5–2 μ, golden- or cinnamon-brown, very finely and moderately echinulate, the pores usually 4, sometimes 3, approximately equatorial.

III. Telia amphigenous, scattered or sometimes with large sori in large compact groups, elliptic or oblong, 1–2 mm. long, rather tardily naked, pulvinate, blackish-brown, ruptured epidermis prominent; teliospores oblong or ellipsoid, 16–23 by 29–45 μ, rounded or obtuse at both ends, or somewhat narrowed below, slightly constricted at septum; wall smooth, dark chestnut-brown, 1–2 μ thick, moderately thickened above, 5–7 μ; pedicel pale-yellow near the spore, colorless below, once to twice length of spore.

ON POACEAE:
Andropogon furcatus Muhl. (*A. provincialis furcatus* Hack., *A. provincialis* Am. Auth. not Lam.), Oklahoma, Texas.
Euchlaena mexicana Schrad., Guatemala.
Zea Mays L., Alabama, Arkansas, California, Colorado, Connecticut, Delaware, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maine, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, Nebraska, New Jersey, New Mexico, New York, North Carolina, North Dakota, Ohio, Pennsylvania, South Carolina, South Dakota, Texas, Vermont, Virginia, West Virginia, Wisconsin, Wyoming; Nova Scotia, Ontario; Mexico (state), Puebla; Guatemala; Cuba; Montserrat.

TYPE LOCALITY: [Bethlehem, Pennsylvania], on *Zea Mays*.

DISTRIBUTION: Widely distributed from eastern Canada throughout the United States to Mexico, Guatemala, and the West Indies; also in South America, Europe, and Africa, and probably wherever Indian corn is cultivated. The form on *Andropogon* is yet imperfectly known.

ILLUSTRATIONS: Bull. Lab. Nat. Hist. Univ. Iowa **4**: *pl. 12, f. 32a, b, c;* Atti Accad. Lincei II. **3**: *pl. 4, f. 149;* McAlpine, Rusts Austr. *pl. C. f. 14, 15, 16, pl. 2, f. 15;* Beitr. Krypt. Schweiz **2**^{2}: *f. 198;* Krypt.-fl. Brand. Pilze **3**: *f. B396;* Corda, Ic. Fung. **6**: *pl. 1, f. 7.*

EXSICCATI: Arth. & Holway, Ured. Exs. Ic. *32a, b, c;* Barth. Fungi Columb. *2777, 3372, 3671, 3672, 3970, 4975, 5073;* Barth. N. Am. Ured. *368, 569, 970, 1776, 1868, 1966, 2060, 2164, 2265;* Brenckle, Fungi Dak. *114, 114a;* Ellis, N. Am. Fungi *268;* Ellis & Ev. N. Am. Fungi *2210;* Ellis & Ev. Fungi Columb. *257, 1906;* D. Griff. W. Am. Fungi *241;* Kellerm. Ohio Fungi *95;* Rab.-Paz. Fungi Eur. *4132;* Rav. Fungi Car. **3**: *92;* Seym. & Earle, Econ. Fungi *72;* Shear, N. Y. Fungi *71;* Sydow, Ured. *921;* Thüm. Myc. Univ. *321b.*

2. **Dicaeoma pallescens** (Arth.) Arthur & Fromme.

Uredo pallida Dietel & Holway; Holway, Bot. Gaz. **24**: 37. 1897. Not *Dicaeoma pallida* Kuntze, 1898.
Puccinia pallescens Arth. Bull. Torrey Club **46**: 111. 1919.

O and I. Pycnia and aecia unknown.

II. Uredinia amphigenous, scattered or in small groups, oval or oblong, 0.3–0.8 mm. long, somewhat bullate, opening rather tardily by a central rupture, pale-yellowish; paraphyses none; urediniospores ellipsoid, obovoid, or pyriform, 13–21 by 20–29 μ; wall colorless or nearly so, thin, about 1 μ, finely and moderately echinulate, the pores equatorial, very indistinct, probably 4.

III. Telia hypophyllous, scattered or associated in rather indefinite groups about 1 cm. across, oval or oblong, 0.5–2 mm. long, long covered by the epidermis, very compact and stromatoid, brownish-black due partly to discoloring of surrounding host-tissue; teliospores cylindric, 1–4-celled, usually 2- or 3-celled, 9–16 by 26–67 μ, truncate or rounded at both ends, slightly or not constricted at septum; wall light golden-brown, thin, 1 μ, slightly thickened above, 2–3 μ, smooth; pedicel very short or lacking.

ON POACEAE:
Tripsacum lanceolatum Rupr. (*T. acutiflorum* Fourn.), Mexico (state).
Tripsacum latifolium Hitchc., Guatemala; Nicaragua; Salvador.
Zea Mays L., Porto Rico.

TYPE LOCALITY: Near City of Mexico, Mexico, on "*Tripsacum dactyloides*," error for *T. lanceolatum*.

DISTRIBUTION: West Indies, southern Mexico, and Central America.

ILLUSTRATION: Bull. Lab. Nat. Hist. Univ. Iowa 5: 175, *f. 1*.

3. **Dicaeoma polysorum** (Underw.) Arth. Résult. Sci. Congr. Bot. Vienne 344. 1906.

Puccinia polysora Underw. Bull. Torrey Club 24: 86. 1897.

O and I. Pycnia and aecia unknown.

II. Uredinia amphigenous, numerous, oblong, 0.5–1 mm. long, tardily dehiscent by a longitudinal slit, slightly pulverulent, cinnamon-brown; urediniospores globoid, ellipsoid or obovoid, 21–29 by 27–34 μ; wall moderately thin, 1.5–2 μ, light cinnamon-brown, finely and rather sparsely echinulate, the pores 5, rarely 4, equatorial.

III. Telia amphigenous, rather few, scattered, linear, 0.5–1.5 mm. in length, long covered by the epidermis, compact, chocolate-brown; teliospores irregularly ellipsoid or obovoid, 18–26 by 29–40 μ, rounded or truncate above, narrowed below, moderately or not constricted at septum; wall chestnut-brown, rather thin, 1.5 μ, only slightly thickened at apex, up to 3 μ, smooth; pedicel tinted, about one-fourth length of spore or less.

ON POACEAE:
Tripsacum dactyloides L. (*T. monostachyum* Willd.), Alabama, Florida, New Jersey; Santo Domingo.
Tripsacum lanceolatum Rupr. (*T. acutiflorum* Fourn.), Morelos.
Tripsacum latifolium Hitchc., Cuba.

TYPE LOCALITY: Auburn, Alabama, on *Tripsacum dactyloides*.

DISTRIBUTION: New Jersey to Alabama, West Indies, and central Mexico.

ILLUSTRATIONS: Bull. Lab. Nat. Hist. Univ. Iowa 5: 176, *f. 2; pl. 1, f. 36a*.

EXSICCATI: Arth. & Holway, Ured. Exs. Ic. *36a;* Ellis & Ev. Fungi Columb. *2068*.

4. **Dicaeoma Ceanothi** (Ellis & Kellerm.) Arthur & Fromme.

Aecidium Ceanothi Ellis & Kellerm. Bull. Torrey Club 11: 114. 1889.
Puccinia Tripsaci Dietel & Holway; Holway, Bot. Gaz. 24: 27. 1897.
Puccinia Pattersoniae Sydow, Monog. Ured. 1: 820. 1904.
Dicaeoma Tripsaci Arth. Résult. Sci. Congr. Bot. Vienne 344. 1906.
Puccinia Ceanothi Arth. Mycologia 2: 233. 1910.

O. Pycnia epiphyllous in irregular, crowded groups of varying size, on discolored spots, inconspicuous, deep-seated, globose, about 100 μ in diameter; ostiolar filaments 35–55 μ long.

I. Aecia hypophyllous, caulicolous, and fructicolous, in irregular, crowded groups on somewhat hypertrophied areas, short-cylindric, 0.3–0.4 mm. broad, 0.5 mm. high; peridium yellowish, margin entire or irregularly lacerate and slightly recurved; peridial cells oblong in vertical section, 21–26 by 24–29 μ, overlapping, the outer wall thick, 10–13 μ, transversely striate, smooth, the inner wall thinner, 5–7 μ, roughly verrucose; aeciospores globoid or oblong, 18–21 by 19–24 μ; wall moderately thick, 2–2.5 μ, colorless, inconspicuously verrucose.

ON RHAMNACEAE:
Ceanothus azureus Desf., Mexico (state).
Ceanothus ovatus Desf. (C. *ovalis* Bigel.), Wisconsin.
Ceanothus pubescens (T. & G.) Rydb., Kansas, Nebraska.

II. Uredinia hypophyllous, oblong-linear or linear, 0.5–1 mm. long, early naked, pulverulent, cinnamon-brown, ruptured epidermis evident; urediniospores globoid or broadly ellipsoid, 24–30 by 27–34 μ; wall thick, 2–3 μ, golden- or cinnamon-brown, moderately echinulate, the pores 3 or 4, usually 3, approximately equatorial.

III. Telia usually hypophyllous, crowded and often confluent, oblong to linear, 0.5–1.5 mm. long, rather tardily naked, compact, pulvinate, blackish-brown, ruptured epidermis conspicuous; teliospores ellipsoid or obovoid, 18–23 by 35–50 μ, rounded or obtuse at both ends, often narrowed below, slightly constricted; wall chestnut-brown, smooth, 1.5–2.5 μ thick, thicker at apex, 5–9 μ; pedicel persistent, tinted, as long as spore or longer.

ON POACEAE:

Andropogon furcatus Muhl. (*A. provincialis furcatus* Hack., *A. provincialis* Am. Auth. not Lam.), Colorado, Kansas, Minnesota, Nebraska, North Dakota, Oklahoma, South Dakota.

Andropogon Hallii Hack., Kansas, Nebraska, North Dakota.

Tripsacum dactyloides L. (*T. monostachyum* Willd.), Kansas, Maryland, Mississippi, Nebraska, North Carolina.

Tripsacum lanceolatum Rupr., Jalisco, Mexico (state).

TYPE LOCALITY: Manhattan, Kansas, [on *Ceanothus ovatus*].

DISTRIBUTION: Maryland to North Dakota, and southward to Mississippi and southern Mexico, chiefly on the plains of the Mississippi valley.

ILLUSTRATION: Bull. Lab. Nat. Hist. Univ. Iowa **5**: *pl. 1, f. 35a.*

EXSICCATI: Arth. & Holway, Ured. Exs. Ic. *35a;* Barth. Fungi Columb. *2265, 2756, 3459;* Barth. N. Am. Ured. *122, 422, 734, 1141, 1536, 1748, 2053;* Brenckle, Fungi Dak. *42;* Carleton, Ured. Am. *12;* Ellis, N. Am. Fungi *1428;* Ellis & Ev. Fungi Columb. *1387;* Sydow, Ured. *1729, 2072.*

5. **Dicaeoma virgatum** (Ellis & Ev.) Kuntze, Rev. Gen. **3**[3]: 471. 1898.

Caeoma Andropogi Schw. Trans. Am. Phil. Soc. II. **4**: 290. 1832. Not *Dicaeoma Andropogonis* Kuntze, 1898.
Puccinia virgata Ellis & Ev. Proc. Acad. Phila. **1893**: 154. 1893.
Puccinia clavispora Ellis & Barth. Erythea **4**: 79. 1896.
Uredo alabamensis Dietel; Atk. Bull. Cornell Univ. **3**: 22. 1897.

O and I. Pycnia and aecia unknown.

II. Uredinia amphigenous, crowded and often confluent, narrowly oblong or linear, 1–3 mm. long, early naked, chestnut-brown, ruptured epidermis conspicuous; paraphyses numerous, clavate or sometimes capitate, 19–23 by 55–80 μ, straight or curved, the wall cinnamon- or chestnut-brown, 2–3 μ thick, 5–9 μ at apex, smooth; urediniospores obovoid, oblong or ellipsoid, 21–31 by 26–42 μ; wall chestnut-brown above, paler below, 2–3 μ thick, usually thicker at apex, 3–5 μ, moderately verrucose, the pores 4, equatorial.

III. Telia amphigenous, crowded and often confluent, oblong or linear, 1–5 mm. long, early naked, blackish-brown, ruptured epidermis conspicuous; teliospores oblong or oblong-clavate, 18–26 by 48–60 μ, rounded or truncate at apex, narrowed at base, slightly constricted at septum, which is above the middle; wall dark chestnut-brown above, paler below, 1.5–2 μ thick, moderately thickened at apex, 5–10 μ; pedicel thick, very short, concolorous, or darker than the base of the spore.

ON POACEAE:

Andropogon condensatus H.B.K. (*Schizachyrium condensatum* Nees), Veracruz.

Sorghastrum incompletum (Presl) Nash (*Andropogon incompletus* Presl), Jalisco, Morelos.

Sorghastrum nutans (L.) Nash (*Andropogon nutans* L., *A. avenaceus* Michx., *Sorghum nutans* A. Gray, *Chrysopogon avenaceus* Benth.), Alabama, Colorado, Florida, Georgia, Kansas, Mississippi, Nebraska, North Carolina, Oklahoma, Pennsylvania, South Carolina, Texas.

TYPE LOCALITY: Rooks County, Kansas, on "*Panicum virgatum*," error for *Sorghastrum nutans*.

DISTRIBUTION: Southern Pennsylvania to Colorado, and southward to Florida, Texas, and southern Mexico.

ILLUSTRATIONS: Bull. Lab. Nat. Hist. Univ. Iowa **5**: 177, 178, *f. 3, 4, 5; pl. 1, f. 37a.*

EXSICCATI: Arth. & Holway, Ured. Exs. Ic. *37a;* Barth. Fungi Columb. *2677, 2971, 3374;* Barth. N. Am. Ured. *73, 2079;* Ellis & Ev. N. Am. Fungi *2888, 3476;* Ellis & Ev. Fungi Columb. *985;* Seym. & Earle, Econ. Fungi *535;* Sydow, Ured. *1066, 2081.*

6. **Dicaeoma Mariae-Wilsoni** (Peck) Arthur & Fromme.

Aecidium Mariae-Wilsoni Peck, Ann. Rep. N. Y. State Mus. **24**: 92. 1872.
Puccinia Ellisiana Thüm. Bull. Torrey Club **6**: 215. 1878.
Puccinia americana Lagerh. Tromsö Mus. Aarsh. **17**: 45. 1895.
Dicaeoma Ellisianum Kuntze, Rev. Gen. **3**[3]: 468. 1898.

O. Pycnia epiphyllous, few, in small groups on pale, discolored spots, inconspicuous, honey-yellow, globose or somewhat conic in longitudinal section, 60–80 μ in diameter; ostiolar filaments about 50 μ long.

I. Aecia hypophyllous, in crowded, circular groups, on pale discolored spots, 2–3 mm. across, cupulate or short-cylindric, small, 0.2–0.3 mm. in diameter; peridium colorless, the margin erose and slightly recurved; peridial cells rhomboidal in longitudinal section, 12–18 μ broad by 15–21 μ long, overlapping, the outer wall thick, 5–9 μ, transversely striate, smooth, the inner wall much thinner, 2–3 μ, moderately verrucose; aeciospores globoid or sometimes ellipsoid and angular from compression, small, 12–16 by 14–19 μ; wall thin, 1–1.5 μ, light-yellow, finely and minutely verrucose.

ON VIOLACEAE:
Viola eriocarpa Schw. (*V. scabriuscula* Schw.), Wisconsin.
Viola fimbriatula Smith, Massachusetts.
Viola lanceolata L., Delaware, New York.
Viola Nuttallii Pursh, Colorado, Kansas.
Viola papilionacea Pursh (*V. palmata cucullata* A. Gray, *V. pratincola* Greene), Illinois, Indiana, Iowa, Kansas, Nebraska, New York, North Dakota, South Dakota.
Viola papilionacea × *sororia* Brainerd, New York.
Viola pedata L., Alabama, Connecticut, Iowa, Maryland, Wisconsin.
Viola pedatifida G. Don (*V. delphinifolia* Nutt.), Iowa, Kansas, New Mexico.
Viola primulifolia L., Maryland.
Viola rostrata Pursh, New York, West Virginia.
Viola sagittata Ait., District of Columbia, New Jersey, Virginia.
Viola septentrionalis Greene, Maine.
Viola sororia Willd. (*V. cuspidata* Greene), West Virginia.
Viola tricolor L., Kansas, Nebraska.

II. Uredinia hypophyllous, scattered, oval or oblong, 0.2–0.5 mm. long, early naked, cinnamon-brown, somewhat pulverulent, ruptured epidermis inconspicuous; urediniospores globoid or broadly ellipsoid, 18–21 by 19–23 μ; wall golden- or light cinnamon-brown, thick, 2.5–3.5 μ, finely and closely verrucose, the pores 3–4, equatorial.

III. Telia hypophyllous, numerous, scattered, occasionally confluent, ovate or oblong, small, 0.2–0.5 mm. long, early naked, pulvinate, dark chocolate-brown, ruptured epidermis somewhat noticeable; teliospores ellipsoid to obovoid, 18–23 by 35–46 μ, rounded or sometimes truncate above, rounded or narrowed below; wall chestnut-brown, 1.5–2.5 μ thick, thicker at apex, 5–10 μ, smooth; pedicel light-yellow, once to once and a half length of spore.

This species is not distinguishable morphologically from *Nigredo pedatata* (Schw.) Arth. except in the possession of two-celled teliospores. The two forms are separately maintained for convenience, but should eventually be united under one name.

ON POACEAE:
Andropogon emersus Fourn. (*A. perforatus* Trin., *Amphilophis emersus* Nash), Jalisco.
Andropogon furcatus Muhl. (*A. provincialis furcatus* Hack., *A. provincialis* Am. Auth. not Lam.), Colorado, Iowa, Michigan, Mississippi, New Mexico, New York, North Dakota.
Andropogon glomeratus (Walt.) B.S.P. (*A. corymbosus* Nash), New Jersey, North Carolina.
Andropogon Liebmanni Hack., Jalisco.
Andropogon scoparius Michx. (*Schizachyrium scoparium* Nash), Colorado, Connecticut. Delaware, Indiana, Iowa, Kansas, Maryland, Massachusetts, Mississippi, Missouri, Nebraska, Nevada, New Hampshire, New Jersey, New Mexico, New York, North Dakota, Oklahoma, South Dakota, West Virginia.
Andropogon semiberbis (Nees) Kunth (*Schizachyrium semiberbe* Nees), Florida.
Andropogon virginicus L., New Jersey, Virginia.

TYPE LOCALITY: Albany, New York, on "*Viola cucullata*," now determined as *V. papilionacea*.
DISTRIBUTION: Massachusetts to North Dakota and eastern Colorado, and southward to Florida and southern Mexico.
ILLUSTRATIONS: Bull. Lab. Nat. Hist. Univ. Iowa **5**: *pl. 1, f. 38a, b.*
EXSICCATI: Arth. & Holway, Ured. Exs. Ic. *38a, b;* Barth. Fungi Columb. *2760, 3576, 3974;* Barth. N. Am. Ured. *204, 276, 435, 939, 2242;* Brenckle, Fungi Dak. *40, 151;* Carleton, Ured. Am. *28;* Ellis & Ev. Fungi Columb. *1908, 2103;* Sydow, Ured. *1165* in part, *1184, 2142, 2366;* Thüm. Myc. Univ. *1336.*

7. **Dicaeoma Andropogonis** (Schw.) Kuntze, Rev. Gen. **3**[3]: 467. 1898.

Aecidium Pentastemonis Schw. Schr. Nat. Ges. Leipzig **1**: 68. 1822. Not *Dicaeoma Pentastemonum* Kuntze, 1898.
Caeoma (*Aecidium*) *pentstemoniatum* Schw. Trans. Am. Phil. Soc. II. **4**: 292. 1832.
Puccinia Andropogi Schw. Trans. Am. Phil. Soc. II. **4**: 295. 1832.
Aecidium (*Caeoma*) *pentstemoniatum* Schw. Trans. Am. Phil. Soc. II. **4**: 309. 1832.
Aecidium pustulatum Curtis; Peck, Ann. Rep. N. Y. State Mus. **23**: 60. 1873.
Aecidium Gerardiae Peck, Ann. Rep. N. Y. State Mus. **25**: 92. 1873.
Aecidium Chelonis W. Gerard, Bull. Torrey Club **5**: 40. 1874.
Aecidium Hamiltoniae Thüm. Bull. Torrey Club **6**: 350. 1879.
Aecidium micropunctum Ellis & Ev. Jour. Myc. **6**: 119. 1891.
Aecidium Palmeri F. W. Anderson, Jour. Myc. **6**: 122. 1891.
Puccinia pustulata Arth. Jour. Myc. **10**: 18. 1904.
Dicaeoma pustulatum Arth. Proc. Ind. Acad. Sci. **1903**: 150. 1904.
Allodus Palmeri Arth. Résult. Sci. Congr. Bot. Vienne 345. 1906.

O. Pycnia amphigenous, abundant, in circular or indefinite groups, honey-yellow, becoming chestnut-brown, punctiform, partly or wholly immersed, flattened-globoid in vertical section, 65–120 μ in diameter; ostiolar filaments 25–45 μ long.

I. Aecia usually hypophyllous, in crowded, circular groups, 2–4 mm. across, cupulate or short-cylindric, small, 0.2–0.3 mm. broad, 0.5–1 mm. high; peridium pale-yellow or colorless, more or less recurved and split into coarse segments; peridial cells rhomboidal, 15–23 by 27–37 μ, somewhat overlapping, the outer wall 6–12 μ thick, finely striate, smooth, the inner wall thinner, 2–5 μ, conspicuously and evenly verrucose; aeciospores globoid, 16–21 by 19–24 μ; wall pale-yellow or colorless, rather thin, 1–2 μ, finely verrucose.

ON SANTALACEAE:

Comandra pallida A. DC., Colorado, Iowa, Kansas, Nebraska, North Dakota.
Comandra umbellata (L.) Nutt., Illinois, Indiana, Iowa, Kansas, Massachusetts, New York, Ohio, Wisconsin; Ontario.

ON SCROPHULARIACEAE:

Aureolaria flava (L.) Farwell (*Gerardia flava* L., *G. quercifolia* Pursh, *G. virginica* Britton in part, *Dasistoma virginica* Britton in part), New Jersey, North Carolina.
Aureolaria microcarpa Pennell, Alabama.
Aureolaria virginica (L.) Pennell (*A. villosa* Raf., *Dasistoma pubescens* Benth., *D. flava* Wood in part, *Rhinanthus virginicus* L.), Connecticut, Michigan, North Carolina.
Castilleja coccinea (L.) Spreng., Iowa.
Castilleja foliolosa H. & A., California.
Castilleja integra A. Gray, Colorado.
Castilleja sessiliflora Pursh, Colorado, Iowa, Nebraska, South Dakota, Wisconsin.
Castilleja sulphurea Rydb., New Mexico.
Chelone glabra L., Connecticut, Massachusetts, New Jersey, New York.
Dasistoma macrophylla (Nutt.) Raf. (*Seymeria macrophylla* Nutt., *Afzelia macrophylla* Kuntze), Nebraska.
Melampyrum lineare Lam. (*M. americanum* Michx.), Connecticut, Delaware, Massachusetts, New Jersey.
Penstemon albidus Nutt., Kansas, South Dakota.
Penstemon alpinus Torr., Colorado, Wyoming.
Penstemon ambiguus Torr., Colorado.
Penstemon angustifolius Nutt. (*P. coeruleus* Nutt.), Kansas, Nebraska.
Penstemon australis Small, Alabama, Mississippi, North Carolina, South Carolina.
Penstemon canescens Britton, Virginia.
Penstemon Digitalis Nutt., Kansas.
Penstemon fruticosus (Pursh) Greene, Wyoming.
Penstemon glaber Pursh, South Dakota.
Penstemon gracilis Nutt., Iowa, South Dakota, Wisconsin.
Penstemon grandiflorus Nutt., Iowa, Kansas, Nebraska, South Dakota.
Penstemon hirsutus (L.) Willd. (*P. pubescens* Soland.), Indiana, New York, Pennsylvania.
Penstemon Jamesii Benth., Oklahoma.
Penstemon Menziesii Hook., California.
Penstemon pallidus Small, Illinois, Missouri.
Penstemon Pentstemon (L.) Britton (*P. laevigatus* Soland.), Indiana, South Carolina, Virginia.
Penstemon secundiflorus Benth., Colorado.
Penstemon tenuiflorus Pennell, Oklahoma.
Penstemon Torreyi Benth., New Mexico.
Penstemon unilateralis Rydb., Colorado.
Penstemon virens Pennell, Colorado.
Penstemon virgatus A. Gray, Arizona.

II. Uredinia chiefly hypophyllous, scattered, early naked, broadly elliptic, small, about 0.3 mm. long, pulverulent, dark cinnamon-brown, ruptured epidermis usually evident; urediniospores globoid, 19–26 by 20–28 μ; wall golden- to cinnamon-brown, moderately thin, 1.5–2 μ, evenly and finely echinulate, the pores variable, when 3–4, either approximately equatorial or 3 basal and 1 above, when 4–6, scattered.

III. Telia chiefly hypophyllous, scattered, oblong or linear, small, 0.3–1.5 mm. long, early naked, pulvinate, blackish-brown, ruptured epidermis usually evident; teliospores obovoid or ellipsoid, 15–21 by 29–48 μ, rounded or obtuse above, somewhat narrowed below, slightly constricted at septum; wall chestnut-brown, 1.5–2 μ thick, somewhat darker and thicker at apex, 5–9 μ; pedicel concolorous with base of spore, as long as spore.

The species consists of two well fixed races separable by the aecial host-families and also by slight morphological differences. The aeciospores from species of *Santalaceae* are slightly smaller and thinner-walled than those from species of *Scrophulariaceae*. Urediniospores of the Santalaceous race are slightly larger and have 4–6 scattered pores, while those of the other race are slightly smaller and usually have 3 or 4 pores, either scattered, equatorial, or partly basal.

ON POACEAE:

Andropogon condensatus H.B.K. (*Schizachyrium condensatum* Nees), Guatemala.
Andropogon furcatus Muhl. (*A. provincialis furcatus* Hack. *A. provincialis* Am. Auth. not Lam.), Alabama, Colorado, Illinois, Indiana, Iowa, Kansas, Minnesota, Mississippi, Missouri, Nebraska, New York, North Dakota, Oklahoma, South Dakota, Texas, West Virginia, Wisconsin; Ontario.

Andropogon glomeratus (Walt.) B.S.P. (*A. corymbosus* Nash), Georgia.
Andropogon Hallii Hack., Colorado, Kansas, Nebraska, Nevada, North Dakota.
Andropogon Pringlei Scribn. & Merr., Mexico (state).
Andropogon scoparius Michx. (*Schizachyrium scoparium* Nash), Alabama, Arizona, Arkansas, Colorado, Delaware, Iowa, Indiana, Kansas, Massachusetts, Michigan, Missouri, Nebraska, Nevada, New York, North Dakota, Ohio, Oklahoma, Pennsylvania, South Carolina, South Dakota, Tennessee, Texas, Vermont, Wisconsin.
Andropogon ternarius Michx. (*A. argyraeus* Schultes), Alabama, South Carolina, Texas.
Andropogon virginicus L., Alabama, Connecticut, Illinois, North Carolina, New York, Oklahoma, Pennsylvania, Virginia.

TYPE LOCALITY: Bethlehem, Pennsylvania, on *Andropogon* sp., now determined as *A. scoparius*.

DISTRIBUTION: Along the southern border of Canada and throughout the United States except the Pacific slope; locally in Mexico and Guatemala.

ILLUSTRATIONS: Bull. Lab. Nat. Hist. Univ. Iowa **5**: *pl. 2, f. 39a–k.*

EXSICCATI: Arth. & Holway, Ured. Exs. Ic. *39a–k;* Barth. Fungi. Columb. *2269, 2465, 2652, 2754, 3061, 3302, 3541, 3542, 3833, 3929, 3964, 4160, 4254;* Barth, N. Am. Ured. *121, 260, 324, 325, 362, 527, 617, 618, 763, 964, 1129, 1741, 2136;* Brenckle, Fungi Dak. *83, 83a, 315, 368;* Carleton, Ured. Am. *46;* Clements, Crypt. Form. Colo. *142, 598, 599;* Ellis, N. Am. Fungi *224, 1433, 1470;* Ellis & Ev. N. Am. Fungi *1813, 2710;* Ellis & Ev. Fungi Columb. *1376, 1457, 2104, 2105;* D. Griff. N. Am. Fungi *34, 93;* Kellerm. Ohio, Fungi *54;* Kellerm. & Swingle, Kans. Fungi *28, 29;* Rab.-Wint. Fungi Eur. *3018, 3222, 3320;* Roum. Fungi Sel. *4618, 4834, 5514;* Seym. & Earle, Econ. Fungi *75, 75b;* Seym. & Earle, Econ. Fungi Suppl. *B30;* Shear, N. Y. Fungi *322;* Sydow, Ured. *57, 850, 1012, 1057, 1165* in part, *2117, 2409;* Thüm. Myc. Univ. *1225, 1424;* Zahlbr. Krypt. *1412.*

8. **Dicaeoma venustulum** (Arth.) Arthur & Fromme.

Uredo venustula Arth. Mycologia **8**: 21. 1916.
Puccinia venustula Arth. Mycologia **10**: 128. 1918.

O and I. Pycnia and aecia unknown.

II. Uredinia hypophyllous, scattered, oblong or linear, 0.3–0.8 mm. long, early naked, chestnut-brown, ruptured epidermis evident; paraphyses numerous, prominent, upright, clavate-capitate, 16–23 by 40–64 μ, the wall golden- or chestnut-brown above, paler below, 1.5–3 μ along the stalk, 6–10 μ above; urediniospores broadly ellipsoid or globoid, 18–23 by 22–27 μ; wall light chestnut-brown, 1–1.5 μ thick, closely and finely echinulate, the pores distinct, 4, equatorial.

III. Telia mostly hypophyllous, scattered, oblong or linear, 0.2–1 mm. long, early naked, compact, blackish, ruptured epidermis evident; teliospores clavate or ellipsoid, 19–23 by 39–50 μ, rounded at both ends or somewhat narrowed below; wall chestnut-brown, 2–3 μ, much darker and thicker above, 9–10 μ, smooth; pedicel short, chestnut-brown.

ON POACEAE:
Andropogon brevifolius Sw. (*Schizachyrium brevifolium* Nees), Costa Rica; Porto Rico.
TYPE LOCALITY: Las Marias, Porto Rico, on *Andropogon brevifolius*.
DISTRIBUTION: West Indies and Central America.

9. **Dicaeoma Kaernbachii** (P. Henn.) Arthur & Fromme.

Uredo Kaernbachii P. Henn. Bot. Jahrb. **18**: Beibl. 44: 23. 1894.
Puccinia Kaernbachii Arth. Bull. Torrey Club **46**: 110. 1919.

O and I. Pycnia and aecia unknown.

II. Uredinia hypophyllous, numerous, in lines, often confluent, elliptic, 0.5–1.3 mm. in length, long covered by the epidermis, finally opening by a longitudinal slit, pulverulent, chestnut-brown, ruptured epidermis conspicuous; paraphyses encircling the sori, usually erect, clavate-capitate, 15–18 by 32–55 μ, the wall pale cinnamon-brown, 2–2.5 μ thick, thicker at apex, 7–10 μ, smooth; urediniospores broadly ellipsoid or obovoid, 18–24 by 26–32 μ; wall chestnut-brown, 1.5–2 μ thick, uniform, finely and closely echinulate, the pores usually 4, equatorial.

III. Telia hypophyllous, numerous, scattered, oblong or linear, 0.3–1 mm. in length, long covered by the epidermis, finally dehiscent by a longitudinal slit, compact, dark chestnut-brown, ruptured epidermis conspicuous; teliospores oblong or oblong-ellipsoid, 16–19 by 35–48 μ, usually rounded above and below, moderately constricted at septum; wall chestnut-brown, 1–2 μ thick, thicker at apex, 5–7 μ, smooth; pedicel concolorous, fragile.

ON POACEAE:
Andropogon condensatus H.B.K. (*Schizachyrium condensatum* Nees), San Luis Potosí; Panama.
Andropogon stolonifer (Nash) Hitchc. (*Schizachyrium stoloniferum* Nash), Florida.

TYPE LOCALITY: Herbertshöhe, Bismarck Archipelago, on "*Andropogon Schoenanthus.*"
DISTRIBUTION: Central Florida, and from central Mexico to Panama; also in New Britain Islands (Bismarck Archipelago).

10. **Dicaeoma infuscans** (Arth. & Holway) Arthur & Fromme.

Puccinia infuscans Arth. & Holway; Arth. Am. Jour. Bot. **5**: 463. 1918.

O and I. Pycnia and aecia unknown.

II. Uredinia hyophyllous, scattered, oblong or linear, 0.5–1 mm. long, soon naked, chestnut-brown, pulverulent, ruptured epidermis evident; urediniospores broadly ellipsoid or obovoid, 20–26 by 26–32 μ; wall dark cinnamon-brown, moderately thick, 2–3 μ, finely and closely verrucose, the pores 4, equatorial, distinct.

III. Telia hypophyllous, scattered, oblong or linear, 0.4–1 mm. long, early naked, chocolate-brown, ruptured epidermis evident; teliospores ellipsoid, 17–23 by 28–35 μ; wall chestnut-brown, 1.5–2 μ thick, lighter and thicker above, 5–7 μ, smooth; pedicel slightly tinted or colorless, once to twice length of spore.

ON POACEAE:
Imperata brasiliensis Trin., Guatemala.
TYPE LOCALITY: Guatemala City, Guatemala, on *Imperata brasiliensis*.
DISTRIBUTION: Known only from the type locality.

11. **Dicaeoma versicolor** (Dietel & Holway) Arth. Résult. Sci. Congr. Bot. Vienne 344. 1906.

Puccinia versicolor Dietel & Holway; Holway, Bot. Gaz. **24**: 28. 1897.

O and I. Pycnia and aecia unknown.

II. Uredinia hypophyllous, oval or oblong, about 0.5 mm. long, orange-yellow, ruptured epidermis apparent; urediniospores obovoid, 23–26 by 32–38 μ; wall colorless, irregularly thickened, 3–5 μ, giving the contents a stellate appearance, sparsely and strongly echinulate, the pores obscure.

III. Telia hypophyllous, numerous and crowded, oblong or linear, 0.5–2 mm. long, early naked, firm, pulvinate, blackish-brown, ruptured epidermis noticeable; teliospores flattened-globoid or ellipsoid, 23–32 by 35–42 μ, rounded above and below, scarcely constricted at septum; wall dark chestnut-brown, 3–4 μ thick, thicker above, 7–10 μ; pedicel colorless, twice length of spore.

ON POACEAE:
Heteropogon contortus (L.) Beauv. (*Andropogon contortus* L.), Jalisco, Puebla.
Heteropogon melanocarpus (Ell.) Benth. (*Andropogon melanocarpus* Ell.), Jalisco, Morelos.
TYPE LOCALITY: Guadalajara, Mexico, on *Andropogon melanocarpus*.
DISTRIBUTION: Southern Mexico.
ILLUSTRATIONS: Bull. Lab. Nat. Hist. Univ. Iowa **5**: *pl. 3, f. 40a–d.*
EXSICCATI: Arth. & Holway, Ured. Exs. Ic. *40a–d;* Barth. N. Am. Ured. *71.*

12. **Dicaeoma purpureum** (Cooke) Kuntze, Rev. Gen. **3**[3]: 470. 1898.

Uredo Sorghi Pass. Comm. Soc. Critt. Ital. **2**: 449. 1867. Not *Dicaeoma Sorghi* Kuntze, 1898.
Uredo Sorghi Fuckel; Thüm. Bot. Zeit. **29**: 27. 1871.
Puccinia purpurea Cooke, Grevillea **5**: 15. 1876.
Puccinia sanguinea Dietel; Atk. Bull. Cornell Univ. **3**: 19. 1897.
Uredo Sorghi-halepensis Pat. Bull. Soc. Myc. Fr. **19**: 253. 1903.
Uredo Andropogonis-hirti Maire, Bull. Soc. Myc. Fr. **21**: 162. 1905.

O and I. Pycnia and aecia unknown.

II. Uredinia amphigenous, somewhat gregarious on purple spots, elliptic, 0.5–1 mm. long, tardily naked, somewhat pulverulent, chestnut-brown, ruptured epidermis conspicuous; paraphyses clavate or capitate, curved, up to 65 μ long, the wall cinnamon-brown, usually with a purple cast, 2–3 μ thick, 5–7 μ at apex, smooth; urediniospores ellipsoid or oblong, often angular, 23–31 by 29–40 μ; wall 1.5–2.5 μ thick, cinnamon- or dark chestnut-brown, finely and rather closely verrucose-echinulate, the pores 5–10, scattered, usually 6–8 in two transverse bands variously located.

III. Telia amphigenous, scattered or somewhat gregarious, oblong, 1–3 mm. long, tardily naked, compact, dark chocolate-brown, ruptured epidermis conspicuous; teliospores ellipsoid or oblong, 23–32 by 40–55 μ, rounded or obtuse at apex, usually narrowed below, slightly or not constricted at septum; wall uniformly colored throughout, dark chestnut- or chocolate-brown, smooth, rather thick, 2–3 μ, moderately thickened at apex, 4–7 μ; pedicel colorless, persistent, once to twice length of spore.

ON POACEAE:

Holcus halepensis L. (*Andropogon halepensis* Brot., *Sorghum halepense* Pers.), Alabama, California, Florida, Louisiana, South Carolina, Texas; Veracruz, Yucatan; Cuba; Jamaica.

Holcus Sorghum L. (*Andropogon Sorghum* Brot., *Sorghum vulgare* Pers., *S. Dora* Griseb.), California, Florida, Oklahoma, Texas; Guerrero; Costa Rica; Bermuda; Cuba; Porto Rico.

Holcus Sorghum sudanensis (Piper) Hitchc., Porto Rico.

TYPE LOCALITY: India, on *Sorghum vulgare*.

DISTRIBUTION: South Carolina to Texas and southern California, and southward through the WestIndies and Central America; also in South America, Europe, Asia, northern Africa, and Hawaii.

EXSICCATI: Barth. Fungi Columb. *2464, 2673, 4670;* Barth. N. Am. Ured. *963, 1072, 1666, 1773;* Ellis & Ev. Fungi Columb. *1656;* Ellis & Ev. N. Am. Fungi *2416;* Rav. Fungi Am. *277;* Sydow, Ured. *2328*.

13. **Dicaeoma Aegopogonis** (Arth. & Holway) Arthur & Fromme.

Puccinia Aegopogonis Arth. & Holway; Arth. Am. Jour. Bot. 5: 467. 1918.

O. Pycnia epiphyllous, numerous, usually crowded in irregular groups, on yellow spots with roseate border, moderately conspicuous, golden-yellow, becoming brownish, globoid or flask-shaped in cross section, 100–150 μ in diameter; ostiolar filaments present, compact.

I. Aecia hypophyllous, irregularly crowded in more or less orbicular groups, up to 2 mm. across, cupulate to short-cylindric, 0.1–0.2 mm. in diameter; peridium light-yellow, margin somewhat recurved, erose; peridial cells rhomboidal, 18–24 by 29–38 μ, usually seen in face view, considerably overlapping, the outer wall colorless, smooth, transversely striate, 7 μ thick, the inner wall thinner, 2–4 μ, finely and closely verrucose; aeciospores globoid or ellipsoid, angular, 15–26 by 19–36 μ; wall colorless, 1–2 μ thick, thickened above up to 7 μ, closely and finely verrucose.

ON CARDUACEAE:

Eupatorium Mairetianum DC., Guatemala.

II. Uredinia hypophyllous, scattered, oblong-linear, small, 0.2–0.5 mm. long, cinnamon-brown, pulverulent, early naked, ruptured epidermis apparent; urediniospores globoid or broadly ellipsoid, 21–25 by 23–29 μ; wall golden- or light cinnamon-brown, thin, 1–1.5 μ, finely and closely echinulate, the pores 6–8, scattered.

III. Telia hypophyllous, like the uredinia in size and distribution, chocolate-brown, early naked; teliospores broadly ellipsoid, 19–22 by 24–28 μ, rounded above and below, slightly or not constricted at septum, which is often oblique; wall chestnut-brown, moderately thin, about 1.5 μ, darker and slightly thicker at apex, 3–5 μ, smooth; pedicel yellowish or colorless, once to twice length of spore.

This species is morphologically identical in all essential characters with *Nigredo Aegopogonis* (Dietel & Holway) Arth., except in the possession of two-celled teliospores. The urediniospores, however, generally range slightly larger. The two forms should eventually be united under one name.

ON POACEAE:

Aegopogon cenchroides Humb. & Bonpl., Guatemala.

Aegopogon tenellus (Cav.) Trin. (*A. unisetus* R. & S.), Guatemala.

TYPE LOCALITY: San Rafael, Department of Guatemala, Guatemala, on *Aegopogon cenchroides*.

DISTRIBUTION: Guatemala.

14. **Dicaeoma Arundinellae** (Arth. & Holway) Arthur & Fromme.

Uredo Arundinellae Arth. & Holway; Arth. Mycologia **10**: 148. 1918.

O and I. Pycnia and aecia unknown.

II. Uredinia hypophyllous, scattered, oval or oblong, minute, 0.1–0.3 mm. long, early naked, pulverulent, cinnamon-brown, ruptured epidermis evident; urediniospores broadly

ellipsoid, globoid or obovoid, 26–29 by 27–37 μ; wall cinnamon- or golden-brown, thin, 1–1.5 μ, moderately echinulate, the pores usually 3, sometimes 2 or 4, equatorial.

III. Telia unknown.

ON POACEAE:
Arundinella Deppeana Nees, Costa Rica.
TYPE LOCALITY: San Ramón, Costa Rica, on *Arundinella Deppeana*.
DISTRIBUTION: Known only from the type locality.

15. **Dicaeoma leve** (Sacc. & Bizz.) Arthur & Fromme.

Diorchidium leve Sacc. & Bizz.; Saccardo, Michelia 2: 648. 1882.
Puccinia levis Magnus, Ber. Deuts. Bot. Ges. 9: 190. 1891.
Puccinia Paspali Tracy & Earle, Bull. Torrey Club 22: 174. 1895.
Puccinia gayazensis P. Henn. Hedwigia 34: 94. 1895.
Dicaeoma Paspali Arth. Résult. Sci. Congr. Bot. Vienne 344. 1906.

O and I. Pycnia and aecia unknown.

II. Uredinia amphigenous, scattered, rounded or elliptic, small, 0.5–1 mm. long, rather tardily naked, chestnut-brown, ruptured epidermis conspicuous; urediniospores globoid or broadly ellipsoid, 19–29 by 24–32 μ; wall cinnamon-brown, 1.5–2 μ thick, moderately and prominently echinulate, the pores 2, sometimes 3, equatorial.

III. Telia amphigenous, scattered, rounded or broadly elliptic, 0.5–1 mm. long, rather tardily naked, blackish-brown, compact, ruptured epidermis conspicuous; teliospores oblong, 21–29 by 32–42 μ, rounded at both ends, slightly constricted at septum, the septum normally horizontal, sometimes oblique or nearly vertical; wall chocolate-brown, smooth, moderately and nearly uniformly thick, 2.5–3 μ, but thicker over the germ pores, 7–9 μ; pedicel colorless, fragile, twice length of spore or more.

ON POACEAE:
Panicum Schiffneri Hack., Oaxaca.
Paspalum crassum Chase, Colima.
Paspalum fimbriatum H.B.K., Antigua; Porto Rico.
Paspalum Humboldtianum Flügge, Guatemala.
Paspalum Larrañagai Arech., Louisiana, Mississippi, Texas.
Paspalum Millegrana Schrad. (*P. Underwoodii* Nash), Porto Rico.
Paspalum plicatulum Michx., Porto Rico.
Rytilix granularis (L.) Skeels (*Manisuris granularis* Sw., *Hackelochloa granularis* Kuntze), Porto Rico; Guadeloupe; Martinique.
TYPE LOCALITY: Brazil, on *Manisuris granularis*.
DISTRIBUTION: Southern United States near the Gulf through the West Indies, Mexico, and Central America; also in northern South America.
ILLUSTRATIONS: Ber. Deuts. Bot. Ges. 9: *pl. 9, f. 28–37*.

16. **Dicaeoma Chaseanum** Arthur & Fromme.

Puccinia Chaseana Arth. & Fromme, Torreya 15: 264. 1915.

O and I. Pycnia and aecia unknown.

II. Uredinia amphigenous, numerous, scattered, oval, 0.3–0.5 mm. long, early naked, cinnamon-brown; paraphyses peripheral, numerous, incurved, cylindric, hyphoid, 5–9 by 30–35 μ, the wall uniformly thin, 1 μ, colorless; urediniospores globoid or broadly ellipsoid, 22–28 by 24–30 μ; wall cinnamon-brown, moderately thin, 1.5–2 μ, closely and finely echinulate, the pores 4, equatorial.

III. Telia amphigenous, inconspicuous, few, long covered by the epidermis; teliospores obovoid or obovoid-clavate, 19–26 by 38–45 μ, truncate or rounded above, somewhat narrowed below, slightly or not constricted at septum; wall cinnamon- or chestnut-brown, darker above, 1–1.5 μ thick, moderately thickened above, 5–7 μ; pedicel tinted.

ON POACEAE:
Anthephora hermaphrodita (L.) Kuntze (*A. elegans* Schreb.), Guatemala; Cuba; Grand Cayman; Jamaica.
TYPE LOCALITY: Jamaica, on *Anthephora hermaphrodita*.
DISTRIBUTION: West Indies and Central America.

17. **Dicaeoma Anthephorae** (Sydow) Arthur & Fromme.

Uredo Anthephorae Sydow, Ann. Myc. 1: 22. 1903.
Puccinia Anthephorae Arth. & Johnston, Mem. Torrey Club 17: 137. 1918.

O and I. Pycnia and aecia unknown.

II. Uredinia chiefly hypophyllous, few, scattered, linear or oblong, 0.2–2 mm. long, early naked, opening by a longitudinal slit, pulverulent, cinnamon-brown, ruptured epidermis usually conspicuous; urediniospores globoid or broadly ellipsoid, 19–26 by 24–29 μ; wall cinnamon-brown, uniformly 2.5–3.5 μ thick, finely and closely verrucose, the pores 3, sometimes 2, equatorial.

III. Telia chiefly hypophyllous, scattered, linear or oblong, 0.2–2 mm. in length, early naked, opening by a longitudinal slit, compact, blackish-brown, ruptured epidermis noticeable; teliospores broadly ellipsoid, 23–26 by 31–35 μ, rounded at both ends, only slightly constricted at septum; wall chestnut-brown, 3–4 μ thick, 5–7 μ thick at apex, including a broad, low, concolorous umbo, smooth; pedicel hyaline, 9 μ broad, not tapering, the wall 1 μ thick, up to 85 μ long, usually persistent.

ON POACEAE:
Anthephora hermaphrodita (L.) Kuntze (*A. elegans* Schreb.), Cuba; Jamaica; St. Croix.
TYPE LOCALITY: Cuba, on *Anthephora elegans*.
DISTRIBUTION: West Indies.

18. **Dicaeoma Huberi** (P. Henn.) Arthur & Fromme.

Puccinia Huberi P. Henn. Hedwigia Beibl. **39**: 76. 1900.
Puccinia Puttemansii P. Henn. Hedwigia **41**: 105. 1902.
Puccinia dolosa Arth. & Fromme, Torreya **15**: 262. 1915.

O and I. Pycnia and aecia unknown.

II. Uredinia amphigenous, scattered or in small groups, on discolored areas, rounded or elliptic, small, 0.5 mm. long, rather tardily dehiscent by a longitudinal rupture, cinnamon-brown, pulverulent, ruptured epidermis evident; urediniospores ellipsoid or obovoid, 16–23 by 21–30 μ; wall pale golden-brown, thin, 1–1.5 μ, moderately and rather strongly echinulate, the pores 2 or 3, equatorial.

III. Telia amphigenous, few, elliptic, small, 0.5 mm. long, tardily naked, chocolate-brown, ruptured epidermis apparent; teliospores ellipsoid or oblong, sometimes irregular with the septum vertical or at an angle, 18–26 by 26–42 μ, usually rounded above, rounded or tapering below, slightly or not constricted at septum; mesospores sometimes present; wall chestnut-brown, moderately thin, 1.5–2 μ, somewhat thicker at apex, 3–7 μ; pedicels golden- or cinnamon-brown, persistent, short, about one half length of spore.

ON POACEAE:
Panicum fasciculatum Sw., Cuba; Porto Rico.
Panicum trichoides Sw., Porto Rico.
Panicum utowanaeum Scribn., Mona Island.
Paspalum paniculatum L., Morelos.
Paspalum tenellum Willd., Jalisco, Mexico (state).
Paspalum virgatum L., Cuba.
TYPE LOCALITY: Botanical Garden, Para, Brazil, on *Panicum ovalifolium*.
DISTRIBUTION: West Indies and southern Mexico; also in northern South America.
ILLUSTRATION: Sydow, Monog. Ured. 1: *pl. 41, f. 539*.
EXSICCATI: Arth. & Holway, Ured. Exs. Ic. *42b*; Sydow, Ured. *1986*.

19. **Dicaeoma macrum** (Arth. & Holway) Arthur & Fromme.

Puccinia macra Arth. & Holway; Arth. Am. Jour. Bot. **5**: 465. 1918.

O and I. Pycnia and aecia unknown.

II. Uredinia chiefly hypophyllous, scattered or in small linear groups, circular or elliptic, small, 0.5–1 mm. long, early naked, orange or yellowish, pulverulent; urediniospores ellipsoid, 23–29 by 28–35 μ; wall thin, 1–1.5 μ, pale-yellow, finely and moderately or rather sparsely echinulate, the pores about 8, scattered.

III. Telia hypophyllous, scattered or sometimes crowded and confluent, elliptic or oblong, 0.5–1.5 mm. long, early naked, dark chestnut-brown, ruptured epidermis evident; teliospores ellipsoid or obovoid-ellipsoid, 23–28 by 35–48 μ, rounded at both ends or slightly narrowed below, slightly constricted at septum; wall chestnut-brown, 1.5–2 μ thick, slightly thickened above, 5–7 μ, smooth; pedicel tinted or nearly colorless, as long as spore.

ON POACEAE:
Paspalum candidum (Humb. & Bonpl.) Kunth, Guatemala.
TYPE LOCALITY: Solola, Guatemala, on *Paspalum candidum*.
DISTRIBUTION: Known only from the type locality.

20. **Dicaeoma tubulosum** (Pat. & Gaill.) Arthur & Fromme.

Aecidium tubulosum Pat. & Gaill. Bull. Soc. Myc. Fr. **4**: 97. 1888.
Aecidium Uleanum Paz. Hedwigia **31**: 95. 1892.
Uredo paspalicola P. Henn. Hedwigia **44**: 57. 1905.
Aecidium solaniphilum Speg. Anal. Mus. Nac. Buenos Aires **23**: 34. 1912.
Uredo Stevensiana Arth. Mycologia **7**: 326. 1915.
Puccinia tubulosa Arth. Am. Jour. Bot. **5**: 464. 1918.

O. Pycnia epiphyllous, crowded upon yellowish areas opposite the aecia, conspicuous, dark-brown, globoid or broadly ellipsoid, 112–144 μ broad by 112–160 μ high; ostiolar filaments slightly projecting, 40–90 μ long.

I. Aecia hypophyllous, crowded upon yellowish areas 1–2 cm. across, cylindric, 0.3–0.5 mm. in diameter, 1–1.5 mm. high; peridium whitish, lacerate, fragile, upper portion soon breaking away; peridial cells broadly oblong or rhomboidal in radial section, 23–35 by 32–45 μ, slightly overlapping, the outer wall 3–5 μ thick, transversely striate, the inner wall 3–6 μ thick, closely and coarsely verrucose; aeciospores irregularly ellipsoid or oblong, 19–26 by 24–34 μ; wall colorless or slightly brownish, 1–1.5 μ thick, closely and finely verrucose.

ON SOLANACEAE:
Solanum tequilense A. Gray, Jalisco.
Solanum torvum Sw., Guatemala; Costa Rica; Cuba; Jamaica; Porto Rico.

II. Uredinia amphigenous, scattered or in small groups on discolored spots, elliptic, small, 0.2–0.8 mm. long, brownish-yellow, rather tardily naked by a longitudinal rupture; paraphyses hyphoid, sometimes few or absent, erect or incurved, clavate, 10–15 by 29–50 μ, the wall colorless, thin, about 1 μ, frequently thicker above or on convex side, 2–4 μ; urediniospores ellipsoid or obovoid, 15–27 by 20–32 μ; wall usually pale-yellow or colorless, sometimes cinnamon-brown, thin, 1–1.5 μ, closely and moderately echinulate, the pores 3 or 4, equatorial, usually indistinct.

III. Telia amphigenous, scattered, rather scarce, round or oblong, small, 0.2–0.6 mm. across, early naked, chocolate-brown, pulverulent, ruptured epidermis somewhat inconspicuous; teliospores elongate-obovoid or ellipsoid, 18–26 by 32–50 μ; wall chestnut- or cinnamon-brown, thin, 1–1.5 μ, thickened and usually darker colored at apex, 4–7 μ, smooth; pedicel tinted, short, about one half length of spore or less.

ON POACEAE:
Axonopus compressus (Sw.) Beauv. (*Paspalum compressum* Rasp., *Anastrophus compressus* Schlecht.), Guatemala; Porto Rico.
Paspalum conjugatum Berg., Guatemala; Panama; Cuba; Porto Rico.
Paspalum Humboldtianum Flügge, Morelos; Guatemala.
Paspalum paniculatum L., Guatemala; Costa Rica; Porto Rico.
Paspalum plicatulum Michx., Cuba; Porto Rico.
Syntherisma digitata Hitchc. (*Digitaria setosa* Desv.), Porto Rico.
Syntherisma sanguinalis (L.) Dulac (*S. marginata* Nash, *Panicum sanguinale* L.), Texas; Panama; Cuba.
Valota insularis (L.) Chase (*Andropogon insularis* L., *Panicum leucophaeum* H.B.K.), Cuba; Porto Rico.

TYPE LOCALITY: Mapire, Venezuela, on *Solanum* [*torvum*?].
DISTRIBUTION: Texas to Central America and the West Indies; also in South America and Asia.
EXSICCATI: Barth. Fungi Columb. *4202;* Pringle, Mex. Fungi *6*.

21. **Dicaeoma Chaetochloae** (Arth.) Arthur & Fromme.

Uredo Chaetochloae Arth. Bull. Torrey Club **33**: 518. 1906.
Puccinia Chaetochloae Arth. Bull. Torrey Club **34**: 585. 1907.

O and I. Pycnia and aecia unknown.

II. Uredinia amphigenous, oblong or linear-oblong, about 0.1 mm. wide, 0.5–2 mm. or more long, somewhat tardily dehiscent by a longitudinal rupture, dark cinnamon-brown, pulverulent, ruptured epidermis conspicuous; urediniospores broadly and angularly ellipsoid or ellipsoid-oblong, 21–29 by 29–45 μ; wall cinnamon-brown, 1.5–2 μ thick, moderately or sparsely and conspicuously echinulate with slightly elongate markings, the pores 3 or 4, approximately equatorial.

III. Telia amphigenous, few, scattered, oblong or linear-oblong, 0.5–1. mm. across, tardily naked by a longitudinal slit, pulverulent, chocolate-brown, ruptured epidermis conspicuous;

teliospores broadly ellipsoid or oblong, 23–26 by 32–37 μ, rounded at both ends or slightly narrowed below, usually somewhat constricted at septum, the septum often oblique or nearly vertical; wall chestnut-brown, 1.5 μ thick, thickened up to 4 μ above; pedicel slightly tinted, short.

ON POACEAE:
Chaetochloa macrosperma Scribn. & Merr., Florida.
Chaetochloa onurus (Willd.) Scribn. & Merr., Cuba; Jamaica.
Chaetochloa setosa (Sw.) Scribn. (*Setaria setosa* L.), Cuba.
Paspalum glabrum Poir. (*P. Helleri* Nash), Porto Rico.
Paspalum orbiculatum Poir., Porto Rico.
Paspalum secans Hitchc. & Chase, Porto Rico.
TYPE LOCALITY: Miami, Florida, on *Chaetochloa macrosperma*.
DISTRIBUTION: Southern Florida and the Greater Antilles.

22. **Dicaeoma inclitum** (Arth.) Arthur & Fromme.

Puccinia inclita Arth. Bull. Torrey Club 46: 115. 1919.

O and I. Pycnia and aecia unknown.

II. Uredinia amphigenous, scattered or loosely grouped on slightly discolored areas, elliptic or linear-oblong, 0.2–0.4 mm. wide by 0.5–1 mm. long, tardily naked, pulverulent, brownish-yellow, ruptured epidermis conspicuous; urediniospores globoid or ellipsoid, 22–26 by 24–32 μ; wall pale-yellow or brownish-yellow, thin, 1–2 μ, coarsely and sparsely echinulate, with elongate, sharply pointed markings, the pores obscure, 3, approximately equatorial.

III. Telia amphigenous, scattered, elliptic or oblong, 0.4–1 mm. long, usually somewhat tardily naked, chocolate-brown, ruptured epidermis conspicuous; teliospores broadly ellipsoid or oblong, 26–29 by 35–40 μ, rounded at both ends, very slightly or not constricted at septum, often with mesospores intermixed, 23–27 by 26–29 μ; wall chestnut-brown, 2.5–3.5 μ thick in upper cell and somewhat thinner in lower cell, thickened above, 3–6 μ and frequently slightly lighter in color, smooth; pedicel golden-brown or paler, of uniform diameter, about one and one half times length of spore.

ON POACEAE:
Ichnanthus pallens (Sw.) Munro, Porto Rico.
Oplismenus hirtellus (L.) Beauv. Porto Rico.
TYPE LOCALITY: Porto Rico, on *Ichnanthus pallens*.
DISTRIBUTION: Porto Rico.

23. **Dicaeoma substriatum** (Ellis & Barth.) Arth. Résult. Sci. Congr. Bot. Vienne 344. 1906.

Puccinia substriata Ellis & Barth. Erythea 5: 47. 1897.

O and I. Pycnia and aecia unknown.

II. Uredinia amphigenous, scattered, elliptic or linear-oblong, somewhat bullate, 0.4–1.5 mm. across, rather early naked, pulverulent, cinnamon-brown, ruptured epidermis conspicuous; urediniospores broadly ellipsoid or obovoid-globoid, 19–30 by 24–35 μ; wall cinnamon-brown, moderately thick, 1.5–2.5 μ, moderately or sparsely and noticeably echinulate, the pores 3 or 4, equatorial or approximately equatorial, rather prominent.

III. Telia amphigenous, scattered, elliptic or linear-oblong, 0.5–1.5 mm. across, early naked, pulverulent, chocolate-brown, ruptured epidermis conspicuous; teliospores oblong, ellipsoid or clavate, 18–24 by 29–48 μ, rounded or truncate above, slightly narrowed or rounded below, slightly constricted at septum; wall chestnut-brown, 1–2 μ thick, thickened above, 3–4 μ, smooth; pedicel slightly tinted near the spore, colorless below, about one-half length of spore.

ON POACEAE:
Chaetochloa geniculata (Lam.) Millsp. & Chase (*C. imberbis* Scribn., *Setaria purpurascens* H.B.K.), Florida; Panama; Cuba; Jamaica; Porto Rico.
Chaetochloa vertcillata (L.) Scribn., Bermuda; Cuba.
Eriochloa Lemmoni Vasey & Scribn., Morelos.
Eriochloa subglabra (Nash) Hitchc., Porto Rico.
Paspalum Bushii Nash, Oklahoma.
Paspalum ciliatifolium Michx., Florida, Texas.
Paspalum Curtisianum Steud., Florida.
Paspalum denticulatum Trin. (*P. lividum* Trin.), Texas.

Paspalum floridanum Michx., Texas.
Paspalum setaceum Michx., Kansas, Nebraska.
Paspalum stramineum Nash, Nebraska.

TYPE LOCALITY: Rooks County, Kansas, on *Paspalum setaceum*.

DISTRIBUTION: Nebraska southward to Florida, Central America, and the West Indies.

ILLUSTRATION: Bull. Lab. Nat. Hist. Univ. Iowa **5**: *pl. 4, f. 42a.*

EXSICCATI: Arth. & Holway, Ured. Exs. Ic. *42a;* Barth. Fungi Columb. *4673;* Barth. N. Am. Ured. *2167;* Ellis & Ev. N. Am. Fungi *3577;* Ellis & Ev. Fungi Columb. *1186;* Sydow, Ured. *1080.*

24. **Dicaeoma impositum** (Arth.) Arthur & Fromme.

Uredo Muhlenbergiae Dietel; Atk. Bull. Cornell Univ. **3**: 22. 1897. Not *Dicaeoma Muhlenbergiae* Arth. 1904.
Puccinia imposita Arth. Bull. Torrey Club **46**: 112. 1919.

O and I. Pycnia and aecia unknown.

II. Uredinia amphigenous, scattered or loosely grouped in brownish or purplish-brown spots, elliptic or oblong, 0.2–0.4 mm. wide by 0.4–1 mm. long, early or somewhat tardily naked, pulverulent, golden- or light cinnamon-brown, ruptured epidermis conspicuous; urediniospores globoid or broadly ellipsoid, 23–32 by 27–35 μ; wall cinnamon-brown, rather thick, 1.5–2.5 μ, closely and finely echinulate, the pores prominent, equatorial, 3 or 4, covered with swollen, hyaline cuticle.

III. Telia amphigenous, disposed similarly to the uredinia, elliptic or oblong, 0.4–1 mm. long, early or somewhat tardily naked, pulverulent, dark cinnamon- or chestnut-brown, ruptured epidermis conspicuous; teliospores oblong or clavate, 18–26 by 37–48 μ, rounded at both ends or slightly narrowed below, usually not constricted at septum; wall dark chestnut-brown above, lighter below, 1.5–2.5 μ thick, thickened 6–8 μ at apex, sometimes also thickened at one side; pedicel golden-brown, short.

ON POACEAE:
Leptoloma cognatum (Schultes) Chase (*Panicum cognatum* Schultes, *P. autumnale* Bosc), Alabama, Kansas, Oklahoma, Texas.

TYPE LOCALITY: Auburn, Lee County, Alabama, on "*Muhlenbergia diffusa,*" error for *Leptoloma cognatum*.

DISTRIBUTION: Gulf States north to Kansas.

25. **Dicaeoma emaculatum** (Schw.) Kuntze, Rev. Gen. **3**[3]: 468. 1898.

Puccinia emaculata Schw. Trans. Am. Phil. Soc. II. **4**: 295. 1832.
Puccinia graminis brevicarpa Peck, Ann. Rep. N. Y. State Mus. **25**: 122. 1873.
Uredo sphaerospora Berk. & Curt.; Cooke, Grevillea **20**: 110, hyponym. 1892.

O and I. Pycnia and aecia unknown.

II. Uredinia chiefly epiphyllous, scattered, small, elliptic, 0.3–0.5 mm. long, early naked, pulverulent, cinnamon-brown, ruptured epidermis conspicuous; urediniospores globoid or broadly ellipsoid, 18–23 by 19–26 μ; wall moderately thin, 1.5–2 μ, cinnamon-brown, finely and closely echinulate, the pores usually 3, sometimes 4, approximately equatorial.

III. Telia chiefly epiphyllous, scattered or sometimes crowded, conspicuous, elliptic or oblong, 0.5–3 mm. long, early naked, compact, pulvinate, chocolate-brown, ruptured epidermis disappearing; teliospores ellipsoid or oblong, 16–23 by 29–48 μ, rounded, tapering or truncate above, somewhat narrowed below, only slightly constricted at septum; wall dark chestnut-brown, smooth, 1.5–2 μ thick, much thicker above, 7–10 μ; pedicel golden-brown, one and a half times length of spore or less.

ON POACEAE:
Panicum capillare L., Delaware, Illinois, Indiana, Iowa, Kansas, Kentucky, Michigan, Minnesota, Mississippi, Missouri, Nebraska, New Jersey, New York, Ohio, Oklahoma, Pennsylvania, Rhode Island, South Dakota, Tennessee, Virginia, West Virginia, Wisconsin; Ontario.
Panicum condensum Nash, Texas.
Panicum flexile (Gatt.) Scribn., Indiana.
Panicum miliaceum L., Indiana.
Panicum philadelphicum Bernh., New Hampshire.
Paspalum stramineum Nash, Oklahoma.

TYPE LOCALITY: Bartram Gardens, Philadelphia, Pennsylvania, on "*Panicum pubescens,*" error for *P. capillare*.

DISTRIBUTION: New York and Ontario to South Dakota, and southward to the Gulf of Mexico.

ILLUSTRATIONS: Bull. Lab. Nat. Hist. Univ. Iowa **4**: *pl. 5, f. 23a–d;* Ann. Rep.N.Y. State Mus. **25**: *pl. 2, f. 36a.*

EXSICCATI: Arth. & Holway, Ured. Exs. Ic. *23a–d;* Barth. Fungi Columb. *4957, 4958;* Barth. N. Am. Ured. *339, 1239, 1753, 1841, 2243;* Carleton, Ured. Am. *37;* Ellis & Ev. Fungi Columb. *2054, 2148;* Ellis, N. Am. Fungi *1029;* Kellerm. Ohio Fungi *56;* Kellerm. & Swingle, Kan. Fungi *15;* Rab.-Wint. Fungi Eur. *3616;* Seym. & Earle, Econ. Fungi *58a, b, c;* Sydow, Ured. *1973.*

26. **Dicaeoma Pammelii** (Trel.) Arth. Proc. Ind. Acad. Sci. **1903**: 149. 1904.

Aecidium Pammelii Trel. Fungi Wis. 32. 1884; Trans. Wis. Acad. **6**: 136. 1885.
Puccinia Panici Dietel, Erythea **3**: 80. 1895.
Puccinia Panici robusta Barth.; Ellis & Ev. Fungi Columb. *1769.* 1903.
Puccinia Pammelii Arth. Jour. Myc. **11**: 56. 1905.

O. Pycnia chiefly epiphyllous, in small circular groups, crowded, conspicuous, honey-yellow, globose in vertical section, 120–155 μ in diameter; ostiolar filaments very short.

I. Aecia hypophyllous, in circular groups, 2–10 mm. in diameter on discolored areas, low-cupulate, small, 0.2–0.3 mm. in diameter; peridium whitish, somewhat evanescent, the margin irregularly lacerate and slightly recurved; peridial cells oblong, 13–19 by 21–35 μ, abutted or slightly imbricate, the outer wall thick, 7–10 μ, smooth, transversely striate, the inner wall thinner, 2–4 μ, verrucose; aeciospores globoid or ellipsoid, 16–23 by 21–32 μ; wall colorless or pale-yellow, 2–3 μ thick, minutely and evenly verrucose.

ON EUPHORBIACEAE:
Dichrophyllum marginatum (Pursh) Kl. & Garcke (*Euphorbia marginata* Pursh), Colorado, Kansas, Nebraska, Oklahoma, Texas.
Tithymalopsis corollata (L.) Kl. & Garcke (*Euphorbia corollata* L.), Alabama, Illinois, Indiana, Iowa, Minnesota, Missouri, Nebraska, Wisconsin.
Tithymalopsis Ipecacuanhae (L.) Small, New Jersey.
Zygophyllidium hexagonum (Nutt.) Small (*Euphorbia hexagona* Nutt.), Nebraska.

II. Uredinia epiphyllous, scattered, oblong, small, 0.5 mm. long, early naked, cinnamon-brown, pulverulent, ruptured epidermis evident; urediniospores broadly ellipsoid, 19–27 by 21–30 μ; wall golden- or light cinnamon-brown, 1.5–2 μ thick, finely and closely echinulate, the pores 3–4, approximately equatorial, inconspicuous.

III. Telia epiphyllous or sometimes amphigenous, scattered or sometimes crowded and forming lines, oblong, small, 0.5–2 mm. long, early naked, compact, dark chocolate-brown, conspicuous, ruptured epidermis evident; teliospores ellipsoid or oblong, 16–24 by 27–45 μ, rounded, obtuse or acute above, narrowed below, slightly or not constricted at septum; wall smooth, dark cinnamon- or chestnut-brown above, paler below, 1–1.5 μ thick, thicker above, 5–7 μ; pedicel colorless or slightly tinted, one to one and a half times length of spore.

This species is morphologically identical with *Nigredo graminicola* except in the presence of two-celled teliospores, and should eventually be united with it under one name.

ON POACEAE:
Panicum virgatum L., Alabama, Colorado, Delaware, Indiana, Iowa, Kansas, Mississippi, Nebraska, New Jersey, Ohio, Pennsylvania, South Dakota, Texas, West Virginia, Wisconsin.
Panicum virgatum cubense Griseb., New Jersey.
TYPE LOCALITY: LaCrosse, Wisconsin, on *Euphorbia corollata.*
DISTRIBUTION: From the Atlantic coast westward to the Rocky mountains, and southward to Mississippi and Alabama.
ILLUSTRATIONS: Bull. Lab. Nat. Hist. Univ. Iowa 4: *pl. 4, f. 20a–c.* .
EXSICCATI: Arth. & Holway, Ured. Exs. Ic. *20a–c;* Barth. Fungi Columb. *3668, 3855;* Barth. N. Am. Ured. *250, 251, 757, 1064;* Ellis & Ev. Fungi Columb. *264, 1389, 1706, 1769;* Ellis, N. Am. Fungi *1427;* Ellis & Ev. N. Am. Fungi *2217, 3048;* Rab.-Paz. Fungi Eur. *4140;* Roum. Fungi Sel. *4413;* Seym. & Earle, Econ. Fungi *544;* Sydow, Ured. *1178, 1249.*

27. **Dicaeoma atrum** (Dietel & Holway) Arth. Résult. Sci. Congr. Bot. Vienne 344. 1906.

Puccinia atra Dietel & Holway; Holway, Bot. Gaz. **24**: 29. 1897.

O and I. Pycnia and aecia unknown.

II. Uredinia epiphyllous, scattered or sometimes confluent, oblong or elliptic, 0.5–2 mm. long, early naked, pulverulent, cinnamon-brown, ruptured epidermis apparent; urediniospores broadly ellipsoid or obovoid, 21–29 by 26–32 μ; wall 1.5–2 μ thick, brownish-yellow or light cinnamon-brown, very minutely and closely verrucose, the pores 4, occasionally 5, equatorial.

III. Telia epiphyllous, scattered or sometimes confluent, oblong or elliptic, 0.5–1.5 mm. long, early naked, somewhat pulverulent, blackish-brown, ruptured epidermis apparent; teliospores broadly ellipsoid, 23–30 by 29–42 μ, rounded at both ends, slightly constricted at septum; wall chestnut-brown, smooth, 1.5–3 μ thick, 5–7 μ above; pedicel colorless, once to twice length of spore.

ON POACEAE:
Chaetochloa Grisebachii (Fourn.) Scribn. (*Setaria Grisebachii* Fourn.), Hidalgo, Mexico (state).
Leptoloma cognatum (Schultes) Chase (*Panicum cognatum* Schultes, *P. autumnale* Bosc), Texas.
Pennisetum bambusiforme Hemsl., Veracruz.
TYPE LOCALITY: Rio Hondo, near City of Mexico, Mexico, on *Setaria Grisebachii*.
DISTRIBUTION: Central Texas to southern Mexico.
ILLUSTRATION: Bull. Lab. Nat. Hist. Univ. Iowa **4**: *pl. 12, f. 33a*.
EXSICCATI: Arth. & Holway, Ured. Exs. Ic. *33a*.

28. **Dicaeoma eslavense** (Dietel & Holway) Arth. Résult. Sci. Congr. Bot. Vienne 344. 1906

Puccinia eslavensis Dietel & Holway; Holway, Bot. Gaz. **24**: 29. 1897.

O and I. Pycnia and aecia unknown.

II. Uredinia mostly epiphyllous, small, oblong or elliptic, 0.5–1 mm. long, cinnamon-brown, ruptured epidermis apparent; urediniospores broadly ellipsoid or obovoid, 23–27 by 24–34 μ; wall dark cinnamon-brown, 2–3.5 μ thick, finely and closely verrucose, the pores 4–6, equatorial.

III. Telia mostly epiphyllous, sometimes crowded and often confluent on the culms, early naked, oblong-linear, 1–5 mm. long, dark chocolate-brown, ruptured epidermis evident; teliospores broadly ellipsoid or oblong, 21–27 by 30–42 μ, rounded at both ends, slightly or not constricted at septum; wall dark chestnut- to chocolate-brown, 2–3 μ thick, thicker at apex, 5–7 μ, smooth; pedicel golden-brown, up to three or four times length of spore.

ON POACEAE:
Panicum bulbosum H.B.K., Chihuahua, Mexico (state).
Panicum bulbosum sciaphilum (Rupr.) Hitchc. & Chase, Arizona, New Mexico; Chihuahua.
Valota insularis (L.) Chase (*Panicum leucophaeum* H.B.K.), Guatemala; Oaxaca.
Valota saccharata (Buckl.) Chase (*Panicum saccharatum* Buckl., *P. lacnanthum Torr.*), New Mexico, Texas; Coahuila.
TYPE LOCALITY: Eslava, Mexico, on *Panicum bulbosum*.
DISTRIBUTION: Texas and New Mexico southward to Guatemala.
ILLUSTRATIONS: Bull. Lab. Nat. Hist. Univ. Iowa **4**: *pl. 5, f. 22a, b*.
EXSICCATI: Arth. & Holway, Ured. Exs. Ic. *22a, b*; Sydow, Ured. *1308*.

29. **Dicaeoma flaccidum** (Berk. & Broome) Kuntze, Rev. Gen. **3**^{3}: 468. 1898.

Puccinia flaccida Berk. & Br., Jour. Linn. Soc. **14**: 91. 1873.
Diorchidium flaccidum Lagerh. Tromsö Mus. Aarsh. **17**: 80. 1895.
Puccinia subdiorchidioides P. Henn. Hedwigia **35**: 244. 1896.

O and I. Pycnia and aecia unknown.

II. Uredinia amphigenous, numerous, scattered or crowded and sometimes forming lines, elliptic or oblong, 0.5–3 mm. long, rather tardily naked, pulverulent, dark cinnamon-brown, ruptured epidermis conspicuous; urediniospores ellipsoid, oblong or obovoid, 18–26 by 23–31 μ; wall moderately thin, 1–2 μ, dark cinnamon- or chestnut-brown, conspicuously and rather closely echinulate, the pores 4–6, scattered, usually 3 or 4 in the equatorial zone and 1 or 2 near the apex.

III. Telia amphigenous, elliptic, small, 0.5–1 mm. long, rather tardily naked, chestnut-brown, ruptured epidermis inconspicuous; teliospores terete, ellipsoid or oblong, 15–26 by 26–48 μ, usually narrowed above and below, slightly constricted at septum, which is usually oblique or nearly vertical; wall cinnamon-brown, paler than the urediniospore-wall, rather thin, 1–1.5 μ, slightly thickened over the pores, 3–5 μ; pedicel colorless, fragile, as long as spore or slightly longer.

ON POACEAE:
Echinochloa Crus-galli (L.) Beauv. (*Panicum Crus-galli* L.), Illinois, Kansas, Missouri, Nebraska, New Mexico, Oklahoma.
Echinochloa holciformis (H.B.K.) Chase (*Panicum holciforme* Steud.), Hidalgo.
Echinochloa zelayensis (H.B.K.) Schultes, Michoacan.
Echinochloa sp., Jalisco.
TYPE LOCALITY: Peradeniya, Ceylon, on *Panicum* sp.
DISTRIBUTION: Illinois and Nebraska to south-central Mexico; also in South America and Asia.
ILLUSTRATIONS: Bull. Lab. Nat. Hist. Univ. Iowa **4**: *pl. 5, f. 21a, pl. 6, f. 23e.*
EXSICCATI: Arth. & Holway, Ured. Exs. Ic. *21a, 23e;* Barth. Fungi Columb. *4960;* Barth. N. Am. Ured. *35, 1444;* Ellis & Ev. Fungi Columb. *1187;* Ellis & Ev. N. Am. Fungi *1836, 3576;* Seym. & Earle, Econ. Fungi *60;* Sydow, Ured. *1069, 1975.*

30. **Dicaeoma Setariae** (Dietel & Holway), Arth. Résult. Sci. Congr. Bot. Vienne 344. 1906.

Puccinia Setariae Dietel & Holway; Holway, Bot. Gaz. **24**: 28. 1897.

O and I. Pycnia and aecia unknown.

II. Uredinia epiphyllous, sometimes hypophyllous, ellipsoid or sublinear, 0.5–2 mm. long, early naked, pulverulent, cinnamon-brown, ruptured epidermis conspicuous; urediniospores globoid or broadly ellipsoid, 26–29 by 30–34 μ; wall thick, about 3 μ, golden-brown, closely and finely verrucose, the pores 6–8, scattered.

III. Telia mostly epiphyllous, ellipsoid or oblong, crowded, 0.5–1.5 mm. long, early naked, pulvinate, blackish-brown, ruptured epidermis noticeable; teliospores broadly ellipsoid or obovoid, 26–34 by 39–48 μ, rounded or obtuse at both ends, slightly or not constricted at septum; wall smooth, dark chestnut-brown, moderately thick, 2.5–3 μ, much thicker at apex, 7–13 μ; pedicel stout, colorless, twice length of spore.

ON POACEAE:
Chaetochloa geniculata (Lam.) Millsp. & Chase (*C. purpurascens* Scribn. & Merr., *C. imberbis* Scribn., *Setaria purpurascens* H.B.K., *S. glauca imberbis* Griseb., *Panicum imberbe* Poir.), Louisiana; Mexico (state).
TYPE LOCALITY: Near City of Mexico, Mexico, on "*Setaria imberbis*", intended for *S. glauca imberbis.*
DISTRIBUTION: Southern United States to southern Mexico.
ILLUSTRATION: Bull. Lab. Nat. Hist. Univ. Iowa **4**: *pl. 12, f. 34a.*
EXSICCATI: Arth. & Holway, Ured. Exs. Ic. *34a.*

31. **Dicaeoma Cameliae** (Mayor) Arthur & Fromme.

Uredo Cameliae Mayor, Mém. Soc. Neuch. Sci. **5**: 578. 1913.
Puccinia Cameliae Arth. Mycologia **7**: 227. 1915.

O and I. Pycnia and aecia unknown.

II. Uredinia amphigenous, scattered, numerous, elliptic, small, 0.5 mm. long, rather tardily naked, cinnamon-brown; urediniospores ellipsoid, 15–21 by 19–28 μ; wall pale-yellow to nearly colorless, thin, about 1 μ, closely and very finely echinulate, the pores obscure, 6–8, scattered.

III. Telia amphigenous, scattered, numerous, oblong or linear, 0.3–0.5 mm. long, blackish-brown, long covered by the epidermis, not bordered by stromal hyphae; teliospores firmly compacted, oblong to cylindric, small, 10–16 by 32–39 μ, truncate or rounded at both ends or sometimes narrowed below, slightly or not constricted at septum; wall chestnut-brown, thin, about 1 μ, darker and somewhat thicker above, 3–5 μ; pedicel very short, usually not seen.

ON POACEAE:
Chaetochloa composita (H.B.K.) Scribn. (*Setaria composita* H.B.K.), Texas.
Chaetochloa polystachya (Scheele) Scribn. & Merr., Texas.
Chaetochloa scandens (Schrad.) Scribn. & Merr. (*Setaria scandens* Schrad.), Jamaica.
Chaetochloa setosa (Sw.) Scribn. (*Panicum setosum* Sw.), Mona Island.
TYPE LOCALITY: Cafetal La Camelia near Angelopolis, Colombia, on *Setaria scandens.*
DISTRIBUTION: Central Texas and the West Indies; also in northern South America.

32. **Dicaeoma Arthuri** (Sydow) Arthur & Fromme.

Puccinia Arthuri Sydow, Monog. Ured. 1: 775. 1904.

O and I. Pycnia and aecia unknown.

II. Uredinia chiefly hypophyllous, scattered or somewhat grouped, oblong, 0.8–1.5 mm. long, soon naked, dark cinnamon-brown, ruptured epidermis noticeable; urediniospores broadly

ellipsoid or oblong, 21–28 by 26–35 μ; wall cinnamon-brown, 1.5–2.5 μ thick, finely and moderately echinulate, the pores 3 or 4, equatorial.

III. Telia amphigenous, numerous, scattered, seldom confluent, elliptic or oblong, 0.5–1 mm. long, rather tardily naked by the longitudinal rupture of the epidermis, blackish-brown, compact, ruptured epidermis conspicuous; teliospores broadly ellipsoid or oblong, 20–29 by 32–42 μ, rounded, obtuse or acute at apex, rounded or tapering at base, slightly or not constricted at septum; wall smooth, dark chestnut-brown, 1.5–2 μ thick, moderately thickened above, 5–7 μ; pedicel stout, persistent, colorless, long, up to twice length of spore or more.

ON POACEAE:
Pennisetum crinitum (H.B.K.) Spreng. (*Gymnothrix crinita* H.B.K.), Michoacan.
TYPE LOCALITY: [Patzcuaro], Mexico, on "*Pennisetum mexicanum*," error for *P. crinitum*.
DISTRIBUTION: South-central Mexico; also in northwestern South America and in Asia.
ILLUSTRATIONS: Bull. Lab. Nat. Hist. Univ. Iowa **5**: *pl. 4, f. 42c, d.*
EXSICCATI: Arth. & Holway, Ured. Exs. Ic. *42c, d.*

33. **Dicaeoma Cenchri** (Dietel & Holway) Arth. Résult. Sci. Congr. Bot. Vienne 344. 1906.

Puccinia Cenchri Dietel & Holway; Holway, Bot. Gaz. **24**: 28. 1897.

O and I. Pycnia and aecia unknown.

II. Uredinia amphigenous, or epiphyllous only, scattered, elliptic, small, about 0.5 mm. long, tardily naked, chestnut-brown, somewhat pulverulent, ruptured epidermis apparent; urediniospores irregularly ellipsoid or oblong, 24–35 by 32–48 μ; wall cinnamon- to light chestnut-brown, moderately thick, 2–3 μ, rather prominently and sparsely echinulate, the pores usually 2, often 3, equatorial, prominent.

III. Telia hypophyllous, scattered, narrowly oblong or linear, small, 0.5–1 mm. long, blackish-brown, long covered by the epidermis; teliospores oblong, cylindric, or clavate, 18–27 by 40–58 μ, truncate, rounded or obtuse above, narrowed below, moderately or not constricted at septum; wall smooth, cinnamon- or dark chestnut-brown, about 1.5 μ thick, moderately thickened at apex, 6–9 μ; pedicel very short, tinted.

ON POACEAE:
Cenchrus echinatus L., Florida; Costa Rica; Guatemala; Bahamas; Cuba; Mona Island; Porto Rico.
Cenchrus pauciflorus Benth. (*C. carolinianus* recent authors not Walt.), Oklahoma, Texas; Porto Rico.
Cenchrus viridis Spreng., Guatemala; Panama; Cuba; Jamaica; Porto Rico.
Pennisetum multiflorum (Presl) Fourn. (*Cenchrus multiflorus* Presl), Jalisco.
TYPE LOCALITY: Guadalajara, Mexico, on *Cenchrus multiflorus*.
DISTRIBUTION: Southern Florida and northern Oklahoma to Panama, and the West Indies.
ILLUSTRATION: Bull. Lab. Nat. Hist. Univ. Iowa **5**: *pl. 3, f. 41a.*
EXSICCATI: Arth. & Holway, Exs. Ured. Ic. *41a.*

34. **Dicaeoma deformatum** (Berk. & Curt.) Kuntze, Rev. Gen. **3**^{3}: 468. 1898.

Puccinia deformata Berk. & Curt.; Berk. Jour. Linn. Soc. **10**: 357. 1869.

O and I. Pycnia and aecia unknown.

II. Uredinia hypophyllous or caulicolous, scattered, oval, minute, 0.1–0.2 mm. in diameter, early naked, pulverulent, yellow, ruptured epidermis evident; paraphyses wanting; urediniospores obovoid, 18–24 by 26–32 μ; wall colorless or pale-brown, 1–1.5 μ thick, rather sparsely and conspicuously echinulate, the pores very indistinct, probably 2 and equatorial.

III. Telia amphigenous and caulicolous, crowded and often confluent, elliptic, 0.5–1 mm. long, early naked, pulvinate, velvety, chestnut-brown; teliospores oblong or ellipsoid, usually irregular with septum oblique or nearly vertical, 21–29 by 32–39 μ, rounded at both ends; wall smooth, dark cinnamon-brown, thick, 3–4 μ, somewhat thicker above, 5–7 μ; pedicel pale-yellow to nearly colorless, very long and slender, up to 5 or 6 times length of spore.

ON POACEAE:
Olyra latifolia L., Nicaragua; Cuba; Jamaica; Porto Rico.
TYPE LOCALITY: Cuba, on *Olyra latifolia*.
DISTRIBUTION: West Indies and Central America; also in South America.

35. **Dicaeoma phakopsoroides** (Arth. & Mains) Arthur & Fromme.

Puccinia phakopsoroides Arth. & Mains, Bull. Torrey Club **46**: 412. 1919.

O and I. Pycnia and aecia unknown.

II. Uredinia amphigenous, in small groups on dark, discolored spots, round, small, 0.1–0.2 mm. in diameter, cinnamon-brown, early naked, ruptured epidermis inconspicuous; paraphyses peripheral, incurved, clavate, 10–12 by 35–50 μ, the wall cinnamon-brown, 1 μ thick, usually thickened up to 2–3 μ on the convex side; urediniospores ellipsoid or broadly obovoid, 19–26 by 27–35 μ; wall brownish or nearly colorless, 1–1.5 μ thick, closely echinulate, the pores very indistinct, probably 2 and equatorial.

III. Telia hypophyllous, scattered, squarish-oblong, 0.5–1 mm. long, long covered by the epidermis, compact with the spores adhering laterally, brownish-black due to discolored host-tissue; teliospores 1–, 2– or 3-celled, short-cylindric, 8–14 by 24–39 μ, rounded above and below, somewhat constricted at septa; wall pale-brown or colorless, smooth, thin, uniformly 1 μ or less in thickness, but with an outer colorless layer swelling in water to 2–3 μ above, demonstrable by staining; pedicel wanting or extremely short and colorless.

ON POACEAE:
Olyra latifolia L., Cuba; Porto Rico.
TYPE LOCALITY: Guantanamo, Cuba, on *Olyra latifolia*.
DISTRIBUTION: Greater Antilles.

36. **Dicaeoma poculiforme** (Jacq.) Kuntze, Rev. Gen. **3**^{3}: 466. 1898.

Lycoperdon poculiforme Jacq. Coll. **1**: 122. 1786.
Lycoperdon lineare Schrank, Baier. Fl. **2**: 669. 1789.
Aecidium Berberidis Pers. in J. F. Gmel. Syst. Nat. **2**: 1473. 1791.
Aecidium lineare Pers. in J. F. Gmel. Syst. Nat. **2**: 1473. 1791.
Lycoperdon Berberidis Duval, Bot. Tasch. Hoppe **1793**: 257. 1793.
Puccinia graminis Pers. Neues Mag. Bot. **1**: 119. 1794.
Uredo frumenti Sow. Engl. Fungi *pl. 140*. 1798.
Puccinia culmorum Schum. Enum. Pl. Saell. **2**: 233. 1801.
Aecidium Berberidis cylindricum Rebent. Prodr. Fl. Neom. 352. 1804.
Aecidium Berberidis cyathiforme Rebent. Prodr. Fl. Neom. 352. 1804.
Puccinia cerealis H. Mart. Fl. Mosq. 183. 1812.
Dicaeoma graminis S. F. Gray, Nat. Arr. Brit. Pl. **1**: 541. 1821.
Caeoma Berberidis Schlecht. Fl. Berol. **2**: 112. 1824.
Caeoma berberidatum Link, in Willd. Sp. Pl. **6**^{2}: 57. 1825.
Puccinia Anthoxanthi Fuckel, Jahrb. Nass. Ver. **27**: 15. 1873.
Puccinia poculiformis Wettst. Verh. Zool.-Bot. Ges. Wien **35**: 544. 1886.
Puccinia Phlei-pratensis Erikss. & Henn. Zeits. Pflanzenkr. **4**: 140. 1894.
Puccinia jubata Ellis & Barth. Erythea **4**: 2. 1896.
Dicaeoma Anthoxanthi Kuntze, Rev. Gen. **3**^{3}: 467. 1898.
Puccinia vilis Arth. Bull. Torrey Club **28**: 663. 1901.
Puccinia Sesleriae-coeruleae Ed. Fisch. Beitr. Krypt. Schweiz **2**^{2}: 259. 1904.
Dicaeoma vile Arth. Résult. Sci. Congr. Bot. Vienne 344. 1906.
Uredo quinqueporula Arth. & Fromme, Torreya **15**: 265. 1915.

O. Pycnia amphigenous, numerous, in crowded, circular groups, on discolored spots, honey-yellow becoming brownish, globoid, 90–110 μ in diameter; ostiolar filaments 30–60 μ long.

I. Aecia hypophyllous, caulicolous, and fructicolous, in crowded, circular groups 1–6 mm. across, on discolored, slightly thickened spots, cupulate or cylindric, 0.2–0.3 mm. in diameter, sometimes attaining a length of 2 mm. but ordinarily much shorter; peridium colorless, the margin erose, slightly recurved; peridial cells oblong, 16–23 by 19–26 μ, the outer wall thick, 10–12 μ, smooth and transversely striate, the inner wall 2–4 μ, moderately verrucose, squarely abutted; aeciospores angularly globoid or oblong, 15–19 by 16–23 μ; wall colorless, 1–1.5 μ thick, considerably thickened above, 5–9 μ, finely and closely verrucose, appearing smooth when wet.

ON BERBERIDACEAE:
Berberis canadensis Mill., Virginia, West Virginia.
Berberis declinatum Schrad. (cult.), Massachusetts.
Berberis Fendleri A. Gray (cult.), Minnesota.
Berberis sinensis Desf. (cult.), Massachusetts.
Berberis vulgaris L. (cult.), Colorado, Idaho, Illinois, Indiana, Iowa, Maine, Massachusetts, Michigan, Minnesota, Missouri, Nebraska, New Jersey, New York, North Carolina, North Dakota, Pennsylvania, South Dakota, Vermont, Washington, Wisconsin; Ontario.

Mahonia diversifolia Sweet (*Berberis Aquifolium* Lindl.) (cult.), Michigan; Quebec.
Mahonia Swaseyi (Buckl.) Fedde (*Berberis trifolia* Schultes, *Odostemon Swaseyi* A. Heller) (cult.), Mexico (state).
Mahonia trifoliolata (Moric.) Fedde (*Berberis trifoliolata* Moric.), proven by culture, but not yet collected in the field.

II. Uredinia caulicolous or epiphyllous, numerous, crowded and often confluent, oblong-linear, 1–5 mm. long, reddish-brown, pulverulent, opening by a lateral rupture of the epidermis which often remains attached at one side as a conspicuous flap; urediniospores oblong, sometimes ellipsoid, 13–24 by 21–42 μ; wall golden-brown at maturity, 1.5–2 μ thick, sometimes slightly thicker at apex, conspicuously and moderately echinulate, the pores 4, rarely 5, equatorial.

III. Telia chiefly caulicolous, numerous, crowded and often confluent in lines, oblong, 1–5 mm. long, blackish-brown, compact, soon naked by the lateral rupture of the epidermis, ruptured epidermis conspicuous; teliospores ellipsoid or oblong-clavate, 16–23 by 35–58 μ, rounded or obtuse above, usually narrowed below, moderately constricted at septum; wall dark chestnut-brown above, paler below, 1–1.5 μ thick, thicker at apex, 5–10 μ; pedicel persistent, golden-brown at the attachment, fading to colorless at base, as long as spore or longer.

Specialization in this species has received much greater attention than in any other species of the *Uredinales* (*cf.* Kleb. Wirtsw. Rostp. 205–236. 1903). Impetus was given to such studies by the classical investigations of Eriksson (Ber. Deuts. Bot. Ges. **12**: 292–312. 1892). Much work has been done in North America as well as elsewhere, of which none is more prominent than that by Stakman and his co-workers (*cf.* Jour. Agr. Res. **10**: 429–495. 1917). The races are many and are based largely upon the behavior of the urediniospores. The most sharply defined race is that upon *Phleum pratense*, which also shows a morphological difference in the smaller size of the urediniospores and mycelium.

ON POACEAE:
Achyrodes aureum (L.) Kuntze (*Lamarckia aurea* Moench), California.
Aegilops sp., Minnesota.
Agropyron caninum (L.) Beauv. (*Triticum caninum* L.), California, Colorado, Minnesota, New York, North Dakota, South Dakota, Utah, Wisconsin, Wyoming; Manitoba.
Agropyron dasystachyum (Hook.) Scribn., Montana, Oregon.
Agropyron pseudorepens Scribn. & Smith, Colorado, Nebraska, North Dakota.
Agropyron repens (L.) Beauv. (*Triticum repens* L.), Indiana, Iowa, Kentucky, Maine, Massachusetts, Michigan, New York, North Dakota, Pennsylvania, South Dakota, Vermont, Wisconsin; Ontario.
Agropyron Richardsoni (Trin.) Schrad., North Dakota, South Dakota.
Agropyron Smithii Rydb. (*A. occidentale* Scribn.), Colorado, Nebraska, New Mexico, North Dakota, South Dakota, Wyoming; Manitoba.
Agropyron tenerum Vasey, Colorado, Iowa, Michigan, Minnesota, Montana, Nebraska, New Mexico, North Dakota, South Dakota, Utah, Wyoming; Manitoba.
Agrostis alba L. (*A. vulgaris* With.), California, Connecticut, Delaware, Indiana, Iowa, Maine, Massachusetts, Michigan, Minnesota, Missouri, Nebraska, New York, Ohio, Oklahoma, Rhode Island, South Dakota, Vermont, Virginia, West Virginia, Wisconsin; Ontario, Quebec.
Agrostis diegoensis Vasey, California.
Agrostis exarata Trin., Montana, Nebraska, Oregon.
Agrostis hyemalis (Walt.) B.S.P. (*A. scabra* Willd.), Iowa, Maine, Massachusetts, Minnesota, Wisconsin.
Agrostis maritima Lam. (*A. alba maritima* Meyer), Nova Scotia.
Agrostis perennans (Walt.) Tuckerm., Connecticut, Maine; New Brunswick, Nova Scotia.
Alopecurus aristulatus Michx. (*A. fulvus* J. G. Smith, *A. geniculatus aristulatus* Torr.), Indiana, Wisconsin.
Alopecurus californicus Vasey, Oregon.
Alopecurus pratensis L., Minnesota, South Dakota.
Anthoxanthum aristatum Boiss., Mississippi.
Anthoxanthum odoratum L., Delaware, Maine, New Jersey, New York; Nova Scotia.
Arrhenatherum elatius (L.) Beauv. (*A. avenaceum* Beauv.), Indiana, Washington.
Avena barbata Brot., California.
Avena fatua L., California, Iowa, Montana, New Mexico, North Dakota, South Dakota, Washington; Manitoba; Mexico (state).
Avena fatua glabrata Peterm., Oregon.
Avena sativa L., California, Colorado, District of Columbia, Illinois, Indiana, Iowa, Kansas, Maine, Maryland, Michigan, Minnesota, Missouri, Montana, Nebraska, New Mexico, New York, North Dakota, Oregon, Oklahoma, South Dakota, Texas, Utah, Virginia, West Virginia, Wisconsin; Ontario.
Beckmannia erucaeformis (L.) Host, Oregon, Utah.
Briza maxima L., Minnesota, Wisconsin.
Briza minor L., Ontario
Bromus japonicus Thunb. Colorado.
Bromus polyanthus Scribn., Montana

Bromus secalinus L., Indiana, Iowa, Wisconsin.
Bromus tectorum L., Colorado.
Bromus tectorum nudum Mert. & Koch, Washington.
Calamagrostis canadensis (Michx.) Beauv., Wisconsin.
Cinna arundinacea L., Connecticut, Indiana, Michigan, Missouri, New York, Ohio, Wisconsin; Ontario.
Cinna latifolia (Trev.) Griseb., Connecticut, New York; Ontario.
Dactylis glomerata L., California, Indiana, Iowa, Kentucky, Minnesota, Missouri, New York, Oregon, South Dakota, Virginia, Wisconsin.
Deschampsia danthonioides Munro (*D. calycina* Presl), California.
Deschampsia holciformis Presl, California.
Deschampsia elongata (Hook.) Munro, Oregon.
Echinochloa Crus-galli (L.) Beauv. (*Panicum Crus-galli* L.), Iowa.
Elymus australis Scribn. & Ball, Arkansas.
Elymus canadensis L., (*E. robustus* Scribn. & Smith) Colorado, Iowa, Kansas, Michigan, Minnesota, Montana, Nebraska, New Mexico, North Dakota, South Dakota, Texas, Utah, Washington, Wisconsin, Wyoming.
Elymus condensatus Presl, California, Colorado, Utah, Washington, Wyoming.
Elymus flavescens Scribn. & Smith, New York.
Elymus glabriflorus (Vasey) Scribn. & Ball (*E. canadensis glabriflorus* Vasey), Texas.
Elymus glaucus Buckl. (*E. americanus* Vasey & Scribn.), Colorado, California, Oregon, Washington.
Elymus Macounii Vasey, Colorado, Minnesota, North Dakota, Utah, Washington; Manitoba.
Elymus striatus Willd., Wisconsin.
Elymus triticoides Buckl., California, Washington.
Elymus virginicus L., South Dakota.
Festuca arizonica Vasey, Colorado.
Festuca elatior L. (*F. pratensis* Huds.), Indiana, Iowa, Oregon, Pennsylvania, Tennessee, Washington, Wyoming.
Festuca megalura Nutt., California, Oregon.
Festuca Myuros L., Minnesota, Oregon.
Festuca pacifica Piper, Oregon.
Hordeum caespitosum Scribn., Montana.
Hordeum distichon L., Missouri, Oregon.
Hordeum Gussoneanum Parl., California.
Hordeum hexastichon L., Missouri.
Hordeum jubatum L., Colorado, Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Montana, Nebraska, New Mexico, North Dakota, Ohio, South Dakota, Texas, Washington, Wisconsin, Wyoming; Manitoba; Mexico (state).
Hordeum murinum L., California.
Hordeum nodosum L., Washington.
Hordeum tetrastichon L., Missouri.
Hordeum vulgare L., California, Indiana, Iowa, Kansas, Kentucky, Minnesota, Missouri, New York, Oregon, Pennsylvania, South Dakota, Wisconsin, Wyoming; Manitoba; Mexico (state).
Hystrix Hystrix (L.) Millsp. (*H. patula* Moench, *Asprella Hystrix* Willd.), Minnesota.
Koeleria cristata (L.) Pers., Kansas, Nebraska, North Dakota, South Dakota.
Lolium multiflorum Lam., Oregon.
Lolium subulatum Vis., Oregon.
Milium effusum L., Wisconsin; Ontario.
Muhlenbergia cuspidata (Torr.) Rydb., Iowa.
Muhlenbergia mexicana (L.) Trin., Iowa.
Panicularia grandis (S. Wats.) Nash (*P. americana* MacM., *Glyceria grandis* S. Wats.), Wisconsin; Ontario.
Panicularia pauciflora (Presl) Kuntze (*Glyceria pauciflora* Presl), California, Montana.
Phalaris angusta Nees, Oklahoma.
Phalaris arundinacea L., California.
Phleum pratense L., Arkansas, California, Colorado, Delaware, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Missouri, Montana, Nebraska, New Hampshire, New Jersey, New York, Oregon, Pennsylvania, South Dakota, Tennessee, Vermont, Virginia, Washington, West Virginia, Wisconsin, Wyoming; Manitoba, Nova Scotia, Ontario.
Polypogon monspeliensis (L.) Desf. (*Alopecurus monspeliensis* L.), Nebraska.
Puccinellia Nuttalliana (Schultes) Hitchc. (*P. airoides* Wats. & Coult., *Poa Nuttalliana* Schultes), California.
Secale cereale L., Connecticut, Indiana, Massachusetts, Wisconsin; Ontario.
Sitanion Hystrix (Nutt.) J. G. Smith (*S. elymoides* Raf., *S. brevifolium* J. G. Smith, *S. longifolium* J. G. Smith, *S. glabrum* J. G. Smith, *Elymus elymoides* Swezey), Colorado, New Mexico, Utah.
Sphenopholis obtusata (Michx.) Scribn. (*Eatonia obtusata* A. Gray), Kansas.
Sphenopholis obtusata lobata Scribn., California.
Sporobolus asper (Michx.) Kunth, Illinois.
Sporobolus cryptandrus (Torr.) A. Gray, Colorado.
Torresia macrophylla (Thurb.) Hitchc. (*Savastana macrophylla* Beal, *Hierochloë macrophylla* Thurb.), Oregon.
Triticum aestivum L. (*T. sativum* Lam., *T. vulgare* Vill.), Alabama, Arkansas, California, Colorado, Delaware, Indiana, Iowa, Kansas, Kentucky, Marylaud, Michigan, Minnesota, Missouri, Montana, Nebraska, New Mexico, New York, North Dakota, Oklahoma, Oregon, Pennsylvania, South Dakota, Texas, Utah, Washington, West Virginia, Wisonsin; Manitoba; Mexico (state), Puebla; Cuba.

Triticum compactum Host, Minnesota, Oregon, Washington.
Triticum dicoccoides Körn. (*T. dicoccum dicoccoides* Cook), Minnesota, Texas.
Triticum dicoccum Schrank, Missouri, Oklahoma, Texas.
Triticum durum Desf., Minnesota, Missouri, Nebraska, North Dakota, South Dakota.
Triticum Freycenetii Host, Missouri.
Triticum monococcum L., Missouri.
Triticum polonicum L., Iowa, Minnesota, Missouri.
Triticum Spelta L., Kansas, Minnesota, Missouri, Wyoming.
Triticum Tumonia Schrad., Missouri.
Triticum turgidum L., Minnesota, Missouri.

TYPE LOCALITY: Austria, on *Berberis vulgaris*.

DISTRIBUTION: Throughout North America where the cereal grains are cultivated, and especially in the United States and Canada; also similarly in all other parts of the world, especially in parts of Europe, Asia, Africa and Australia.

ILLUSTRATIONS: Bull. Lab. Nat. Hist. Univ. Iowa **4**: *pl. 8–10, f. 30a–r;* Bull. U. S. Dep. Agr. **16**: 52; Erikss. & Henn. Getreider. *pl. 1–4, f. 1–51;* Zeits. Pflanzenkr. **8**: 334; Gard. Chron. **22**: 308; Grove, Brit. Rust Fungi *f. 193, 194;* Ann. Bot. K. & S. **2**: *pl. 3, 4;* Rostr. Plantep. Haandb. *f. 83, 84;* Krypt.-fl. Brand. Pilze **3**: *f. B94, B103;* McAlpine, Rusts Austr. *pl. A, f. 3, 4; pl. 1, f. 2, 5, 7, 8; pl. 3, f. 20, 21; pl. 14, f. 113–122;* Yearbook U. S. Dep. Agr. **1918**: *pl. 4; pl. 5, f. 2.*

EXSICCATI: Arth. & Holway, Ured. Exs. Ic. *30a–r;* Barth. N. Am. Ured. *443, 444, 635, 636, 741, 842, 942, 1044, 1045, 1150, 1151, 1343, 1344, 1445, 1543, 1544, 1545, 1546, 1632, 1651, 1756, 1757, 1842, 1843, 1844, 1939, 1940, 2037, 2038, 2247;* Barth. Fungi Columb. *2266, 2461, 2571, 3071, 3363, 3364, 3461, 3540, 3552, 3553, 3554, 3657, 3753, 3841, 3842, 3936, 3937, 3938, 3939, 4262, 4263, 4357, 4663, 4850, 4961, 5058, 5059;* Brenckle, Fungi Dak. *13, 43, 44, 44a, b, c, 444;* Carleton, Ured. Am. *9, 29;* Ellis, N. Am. Fungi *1010, 1028;* Ellis & Ev. Fungi Columb. *1384, 1472, 1972, 1973, 2066, 2067, 2153, 2154, 2155, 2156;* Garrett, Fungi Utah. *160, 186;* D. Griff. W. Am. Fungi *5, 5a, 17, 18, 20* in part, *87, 267, 268a* in part; Seymour & Earle, Econ. Fungi *84, 85, 86a, b, 87a, b, 89, 90, 91* in part, *92, 93, 394, 397, 539;* Rav. Fungi Car. **1**: *99;* Shear, N. Y. Fungi *68;* Sydow, Ured. *1269;* Vesterg. Mic. Rar. Sel. *1562.*

37. **Dicaeoma Majanthae** (Schum.) Arth. Proc. Ind. Acad. Sci. **1903**: 149. 1904.

Aecidium Majanthae Schum. Enum. Pl. Saell. **2**: 224. 1803.
Aecidium Convallariae Schum. Enum. Pl. Saell. **2**: 224. 1803.
Aecidium Uvulariae Schw. Schr. Nat. Ges. Leipzig **1**: 69. 1822.
Caeoma elegans Schlecht. Fl. Berol. **2**: 115. 1824.
Caeoma convallariatum Link, in Willd. Sp. Pl. **6**^{2}: 42. 1825.
Uredo Convallariarum Spreng. Syst. Veg. **4**: 573. 1827.
Caeoma (*Aecidium*) *uvulariatum* Schw. Trans. Am. Phil. Soc. II. **4**: 292. 1832.
Aecidium (*Caeoma*) *uvulariatum* Schw. Trans. Am. Phil. Soc. II. **4**: 309. 1832.
Puccinia sessilis Schneid.; Schroet. Abh. Schles. Ges. **48**: 19. 1870.
Aecidium Iridis W. Gerard; Peck, Rep. N. Y. State Mus. **24**: 93. 1872.
Puccinia linearis Peck, Bull. Buffalo Soc. Nat. Sci. **1**: 67. 1873.
Puccinia striatula Peck, Ann. Rep. N. Y. State Mus. **33**: 38. 1880.
Puccinia Phalaridis Plowr. Jour. Linn. Soc. **24**: 88. 1888.
Puccinia Digraphidis Soppitt, Jour. Bot. **28**: 213. 1890.
Puccinia Paridis Plowr. Jour. Linn. Soc. **30**: 43. 1893.
Puccinia Convallariae-Digraphidis Kleb. Zeits. Pflanzenkr. **6**: 261. 1896.
Puccinia Smilacearum-Digraphidis Kleb. Zeits. Pflanzenkr. **6**: 261. 1896.
Dicaeoma striatulum Kuntze, Rev. Gen. **3**^{3}: 470. 1898.
Puccinia Majanthae Arth. & Holway, Bull. Lab. Nat. Hist. Univ. Iowa **5**: 188. 1901.
Dicaeoma lineare Arth. Résult. Sci. Congr. Bot. Vienne 344. 1906.

O. Pycnia amphigenous, in large circular groups, on brownish spots 5–10 mm. or more across, honey-yellow becoming brownish, globose in vertical section, 90–125 μ in diameter; ostiolar filaments 20–50 μ long.

I. Aecia hypophyllous, in circular groups on discolored spots 5–10 mm. or more across, low-cupulate, 0.3–0.5 mm. in diameter, usually not accompanied by hypertrophy of the host tissue; peridium yellowish, low, rather fragile, the margin finely eroded and recurved; peridial cells oblong or rhomboidal, 19–26 by 29–35 μ, overlapping, the outer wall thick, 7–12 μ, smooth, transversely striate, the inner wall somewhat thinner, 5–9 μ, verrucose; aeciospores angularly globoid or ellipsoid, large, 15–21 by 16–27 μ; wall colorless or pale-yellow, rather thin, 1–2 μ, moderately and finely verrucose.

ON CONVALLARIACEAE:
Polygonatum biflorum (Walt.) Ell. (*Salomonia biflora* Farwell), Alabama, Iowa.
Polygonatum commutatum (R. & S.) Dietr. (*P. giganteum* Dietr., *Salomonia commutata* Britton), Iowa, Wisconsin.
Unifolium canadense (Desf.) Greene (*Maianthemum canadense* Desf.), Michigan, Minnesota, Wisconsin; Nova Scotia.
Uvularia grandiflora Smith, Iowa, Missouri.
Uvularia perfoliata L., North Carolina.
Uvularia sessilifolia L. (*Oakesia sessilifolia* S. Wats.), Delaware, New York, Wisconsin.
Vagnera racemosa (L.) Morong (*Smilacina racemosa* Desf.). Iowa, Pennsylvania.

Vagnera sessilifolia (Baker) Greene (*Smilacina sessilifolia* Nutt.), Washington.
Vagnera stellata (L.) Morong (*Smilacina stellata* Desf.), Idaho, Nebraska, North Dakota; British Columbia, Manitoba, Ontario.

ON IRIDACEAE:

Iris versicolor L., Indiana, Iowa, Massachusetts, Michigan, Minnesota, Nebraska, New York, Wisconsin; Quebec.

II. Uredinia amphigenous, scattered, narrowly oblong or linear, 0.5–0.8 mm. long, early naked, somewhat pulverulent, cinnamon-brown, opening by a longitudinal slit, ruptured epidermis evident; urediniospores ellipsoid, 19–26 by 24–34 μ; wall golden- to cinnamon-brown, moderately thin, 1.5–2 μ, finely and moderately echinulate, the pores about 8, scattered.

III. Telia amphigenous, scattered, sometimes confluent in long lines on the sheaths, oblong-linear, 0.5–2 mm. long, grayish-black, long covered by the epidermis; teliospores oblong or oblong-clavate, 19–26 by 35–55 μ, rounded or more often truncate above, usually narrowed below, slightly or not constricted at septum; wall smooth, thin, about 1.5 μ, chestnut-brown, somewhat darker and thicker above, 3–5 μ; pedicel tinted, short, usually deciduous.

The species in Europe is composed of many well defined races (*cf.* Kleb. Wirtsw. Rostp. 263–272. 1903), and in North America appears to have similar but different races, although too few cultures have yet been made to indicate clearly the true situation.

ON POACEAE:

Phalaris angusta Nees, Oklahoma.
Phalaris arundinacea L., Colorado, Indiana, Iowa, Michigan, Montana, New York, Oregon, South Dakota, Wisconsin, Wyoming; Manitoba, Ontario.
Phalaris californica H. & A. (*P. amethystina* Thurber, not Trin.), California.
Phalaris canariensis L., California.
Phalaris minor Retz., California.

TYPE LOCALITY: Island of Zealand, Denmark, on *Convallaria bifolia*.

DISTRIBUTION: Nova Scotia westward to Manitoba and Oregon, and southward to Alabama and Texas; also in Europe and Japan.

ILLUSTRATIONS: Bull. Lab. Nat. Hist. Univ. Iowa **5**: *pl. 4, f. 44a, b;* Zeits. Pflanzenkr. **2**: *pl. 5, f. 10a, b;* Briosi & Cavara, Funghi Par. *285*.

EXSICCATI: Arth. & Holway, Ured. Exs. Ic. *44a, b;* Barth. Fungi Columb. *2203, 3571, 4273, 4370;* Barth. N. Am. Ured. *567, 1075;* D. Griff. W. Am. Fungi *26, 26a, b;* Ellis, N. Am. Fungi *229, 1014, 1421, 1475;* Rab.-Wint. Fungi Eur. *2927, 3026a;* Roum. Fungi Sel. *4824, 4917;* Sydow, Ured. *1781, 2429;* Thüm. Myc. Univ. *1433, 1519*.

38. **Dicaeoma unicum** (Holway) Arthur & Fromme.

Puccinia unica Holway; Arth. & Fromme, Torreya 15: 263. 1915.

O and I. Pycnia and aecia unknown.

II. Uredinia not seen; urediniospores intermixed with the teliospores; uredinial paraphyses numerous, intermixed, capitate, 13–18 μ broad above, up to 60 μ long, the wall colorless or golden-brown, about 7 μ thick above, narrowing abruptly to about 2 μ in the pedicel which is often solid and concolorous; urediniospores ellipsoid, 19–24 by 24–29 μ; wall cinnamon-brown, 1.5–2 μ, inconspicuously and rather closely echinulate, the pores 4 or 5, approximately equatorial.

III. Telia culmicolous and epiphyllous, crowded and often confluent in lines, elliptic or oblong-linear, 0.5–2 mm. long, early naked, pulvinate, blackish-brown, ruptured epidermis inconspicuous; teliospores ellipsoid, 21–26 by 29–39 μ, rounded at both ends, slightly or not constricted at septum; wall dark chestnut-brown, smooth, 2–3 μ thick, slightly thickened at apex, up to 6 μ; pedicel colorless, twice length of spore or more.

ON POACEAE:

Aristida longiramea Presl, Morelos.

TYPE LOCALITY: Cuernavaca, Morelos, on *Aristida longiramea*.

DISTRIBUTION: Known only from the type locality.

39. **Dicaeoma interveniens** (Peck) Arthur & Fromme.

Roestelia interveniens Peck, Bull. Torrey Club **10**: 74. 1883.
Aecidium roestelioides Ellis & Ev. Jour. Myc. **1**: 93. 1885.
Aecidium Malvastri P. Henn. Hedwigia **36**: 216. 1897.
Puccinia Burnettii D. Griff. Bull. Torrey Club **29**: 298. 1902.
Aecidium interveniens Farl. Bibl. Index N. Am. Fungi **1**: 58. 1905.
Dicaeoma Burnettii Arth. Résult. Sci. Congr. Bot. Vienne 344. 1906.
Puccinia interveniens Bethel; Blasdale, Univ. Calif. Publ. Bot. **7**: 119. 1919.

O. Pycnia amphigenous, few, in small groups on discolored spots, becoming brownish, punctiform, flask-shaped, 160 μ broad by 180 μ high; ostiolar filaments 110 μ long.

I. Aecia hypophyllous and caulicolous, in circular groups 3–6 mm. in diameter, surrounding the pycnia, or more often distributed over larger areas on *Callirhoë*, cupulate or short-cylindric, 0.5–0.8 mm. broad by 0.5–1 mm. high, the opening somewhat constricted; peridium pale yellow or colorless, becoming finely lacerate and somewhat recurved almost to the base; peridial cells oblong or rhomboidal, 21–35 by 35–55 μ, the outer wall very thick, 10–18 μ, smooth and transversely striate, the inner wall much thinner, 2–3 μ, very finely and inconspicuously verrucose; aeciospores globoid or ellipsoid, 16–24 by 18–27 μ; wall colorless, thick, 2–5 μ, finely verrucose.

ON MALVACEAE:

Callirhoë alceoides (Michx.) A. Gray, Nebraska.
Callirhoë digitata Nutt., Texas.
Malvastrum fasciculatum (Nutt.) Greene (*M. Thurberi* A. Gray), California; Lower California.
Malvastrum marrubioides Durand & Hilgard, California.
Phymosia rivularis (Dougl.) Rydb. (*Sphaeralcea rivularis* Torr.), Washington.
Sidalcea asprella Greene, California.
Sidalcea candida A. Gray, Utah.
Sidalcea malvaeflora (Moc. & Sessé) A. Gray (*S. humilis* A. Gray, *S. delphinifolia* Greene), California.
Sidalcea neo-mexicana A. Gray, Colorado, Utah.
Sidalcea nervata A. Nelson, Idaho.

II. Uredinia not seen; urediniospores intermixed with the teliospores, ellipsoid to obovoid, 20–27 by 26–32 μ; wall golden-yellow, about 3 μ thick, moderately and finely verrucose or verrucose-echinulate, the pores 4, equatorial.

III. Telia epiphyllous, scattered, early naked, very large, oblong-linear or fusiform, 5–10 mm. long by 1–2 mm. broad, or usually as broad as the leaf, chocolate-brown, the epidermis rupturing in longitudinal shreds full length of the sorus; teliospores ellipsoid or oblong, 20–29 by 35–42 μ, rounded at both ends, not constricted at septum; wall dark cinnamon-brown above, paler below, 2–3 μ thick, moderately thickened above, 4–7 μ, smooth; pedicel colorless, two to three times length of spore.

ON POACEAE:

Oryzopsis hymenoides (R. & S.) Ricker (*O. cuspidata* Benth., *Eriocoma cuspidata* Nutt.), California, Nevada.
Stipa comata Trin. & Rupr., Colorado, Wyoming.
Stipa lepida Andersoni (Vasey) Hitchc. (*S. eminens Andersoni* Vasey), California.
Stipa Lettermani Vasey, Colorado.
Stipa minor (Vasey) Scribn., Colorado, Utah.
Stipa occidentalis Thurb., California.
Stipa pulchra Hitchc., California.
Stipa speciosa Trin. & Rupr., California.

TYPE LOCALITY: Lower California, on *Malvastrum Thurberi*.

DISTRIBUTION: Wyoming to Washington and southward to Texas and Lower California; also in South America.

ILLUSTRATIONS: Bull. Torrey Club **29**: 298.

EXSICCATI: Barth. Fungi Columb. *2404, 3201;* Barth. N. Am. Ured. *206, 1937, 2102;* Clements, Crypt. Form. Colo. *600;* D. Griff. W. Am. Fungi *387;* Garrett, Fungi Utah. *193*.

40. **Dicaeoma Stipae** (Arth.) Kuntze, Rev. Gen. **3**^{3}**:** 470. 1898.

Aecidium Bigeloviae Peck, Bot. Gaz. **3**: 35. 1878. Not *Dicaeoma Bigelowiae* Kuntze, 1898.
Puccinia Stipae Arth. Bull. Iowa Agr. Coll. Dep. Bot. **1884**: 160. 1884.
Aecidium crepidicola Ell. & Gall. Jour. Myc. **6**: 31. 1890.
Aecidium compositarum Lygodesmiae Webber; De-Toni, in Sacc. Syll. Fung. **9**: 323. 1891.
Aecidium Chrysopsidis Ellis & And. Bot. Gaz. **16**: 48. 1891.
Aecidium solidaginicola Ellis & Ev. Erythea **1**: 216. 1893.
Aecidium sclerothecioides Ellis & Ev. Am. Nat. **31**: 428. 1897.
Aecidium Lygodesmiae Shear; Ellis & Ev. Fungi Columb. *1476*. 1901.
Aecidium incurvum Tracy & Earle, in Greene, Pl. Baker. **1**: 18. 1901.
Aecidium Grindeliae D. Griff. Bull. Torrey Club **29**: 299. 1902. Not *A. Grindeliae* Sydow, 1901.
Aecidium recedens Arth. Bull. Torrey Club **31**: 7. 1904.

O. Pycnia amphigenous, irregularly grouped, punctiform, honey-yellow, becoming orange-brown, partially extruded, globose in vertical section, 90–110 μ broad, 100–115 μ deep; ostiolar filaments 50–112 μ long, agglutinated to form a prominent column.

I. Aecia amphigenous, in irregular crowded groups on hypertrophied areas, small, 0.3–

0.4 mm. in diameter, golden-brown, surrounded by hypertrophied host tissue, gall-like, opening by a central aperture; peridium fragile and evanescent; peridial cells abutted or slightly imbricate, ovoid or oblong, 19–27 by 26–58 μ, the walls colorless, the outer wall inconspicuously verruculose, 2–4 μ thick, the inner wall thicker, 3–7 μ, tessellated with distinct, irregular elevations; aeciospores globoid, 21–26 by 22–29 μ; wall cinnamon-brown, moderately thick, 1.5–2 μ, sometimes 3–5 μ, evenly and finely verrucose, occasionally tuberculose, the pores sometimes apparent, 6–8, scattered.

ON CICHORIACEAE:
Agoseris laciniata (Nutt.) Greene, Colorado.
Agoseris leptocarpa Osterhout, Colorado.
Crepis acuminata Nutt., Montana.
Crepis glauca (Nutt.) T. & G., Utah.
Lygodesmia juncea (Pursh) D. Don, Colorado, Montana, Nebraska, South Dakota.

ON CARDUACEAE:
Aster amethystinus Nutt., Nebraska.
Aster exiguus (Fernald) Rydb., Nebraska, North Dakota.
Aster multiflorus Ait., Iowa, Kansas, Nebraska, South Dakota.
Aster Porteri A. Gray, Colorado.
Chrysopsis villosa (Pursh) Nutt., Arizona, Colorado, Montana, Nebraska.
Chrysothamnus graveolens (Nutt.) Greene (*Bigelovia graveolens* A. Gray), Colorado.
Chrysothamnus pulcherrimus A. Nelson, Colorado.
Chrysothamnus serrulatus (Torr.) Rydb. (*Bigelovia Douglasii serrulata* Gray), Colorado.
Chrysothamnus viscidiflorus (Hook.) Nutt. (*Bigelovia Douglasii* A. Gray), Colorado.
Erigeron flagellaris A. Gray, Colorado.
Grindelia squarrosa (Pursh) Dunal, Colorado, Nebraska, North Dakota, South Dakota.
Gutierrezia Sarothrae (Pursh) Britton & Rusby (*G. Euthamiae* T. & G.), Colorado, Montana, Nebraska, Texas.
Senecio densus Greene (*S. compactus* Rydb.), Colorado.
Senecio integerrimus Nutt., Colorado.
Senecio oblanceolatus Rydb., Colorado.
Senecio perplexus A. Nelson, Colorado, Wyoming.
Senecio pudicus Greene (*S. cernuus* A. Gray), Colorado.
Senecio Riddellii T. & G., Nebraska.
Senecio salicinus Rydb., Colorado.
Senecio spartioides T. & G., Colorado.
Solidago concinna A. Nelson, Colorado.
Solidago glaberrima Martens, Colorado, Nebraska, North Dakota.
Solidago mollis Bartl., Montana, Nebraska, North Dakota, South Dakota; Alberta.
Solidago rigida L., Nebraska, North Dakota.
Solidago serotina Ait. (*S. Pitcheri* Nutt.), New Mexico.

II. Uredinia mostly epiphyllous, oblong, small, 0.3–0.4 mm. long, cinnamon-brown, inconspicuous, early naked; urediniospores broadly ellipsoid or obovoid, 18–23 by 21–26 μ; wall moderately thin, 1.5–2 μ, golden-brown or yellow, closely and finely echinulate, the pores 6–8, scattered.

III. Telia epiphyllous, scattered or crowded, ovate to oblong, 0.5–2 mm. long, early naked, dark chocolate-brown, pulvinate, ruptured epidermis not conspicuous; teliospores ellipsoid, oblong or cylindric, 18–23 by 35–64 μ, rounded, obtuse or sometimes truncate above, rounded or narrowed below, noticeably constricted at septum; wall dark golden- to chestnut-brown, 1.5–2 μ thick, 5–10 μ at apex; pedicel usually persistent, slightly tinted, 2–3 times length of spore.

ON POACEAE:
Koeleria cristata (L.) Pers., Colorado.
Oryzopsis hymenoides (R. & S.) Ricker (*O. cuspidata* Benth., *Eriocoma cuspidata* Nutt.), Arizona, Colorado.
Stipa arida M. E. Jones, Arizona.
Stipa californica Merr. & Davy, California; Lower California.
Stipa comata Trin. & Rupr. (*S. Tweedyi* Scribn.), Arizona, Colorado, Montana, Nebraska, Oregon, North Dakota, South Dakota, Utah, Wyoming; Manitoba.
Stipa eminens Cav., Hidalgo.
Stipa lepida Andersoni (Vasey) Hitchc. (*S. eminens Andersoni* Vasey), California.
Stipa leucotricha Trin. & Rupr., Lower California.
Stipa pulchra Hitchc., California.
Stipa spartea Trin., Colorado, Iowa, Minnesota, Nebraska, North Dakota, South Dakota, Wisconsin.
Stipa sp., Zacatecas.

TYPE LOCALITY: Ames, Iowa, on *Stipa spartea*.
DISTRIBUTION: Wisconsin, Manitoba, and Alberta, and southward to Texas and central Mexico.
ILLUSTRATIONS: Bull. Lab. Nat. Hist. Univ. Iowa **4**: *pl. 7, f. 27a–c*.
EXSICCATI: Arth. & Holway, Ured. Exs. Ic. *27a–c;* Barth. N. Am. Ured. *61, 662, 663, 971, 1777, 1869, 2061, 2165, 2166, 2267, 2268, 2269;* Barth. Fungi Columb. *3466, 3572, 4672, 4976, 4977;* Brenckle, Fungi Dak. *67, 103, 188, 201;* Ellis & Ev. N. Am. Fungi *2245;* Ellis & Ev. Fungi Columb. *1476, 1663, 1703, 1804, 2160;* Garrett, Fungi Utah. *237;* D. Griff. W. Am. Fungi *280, 388*.

41. **Dicaeoma scaber** (Ellis & Ev.) Arth. Résult. Sci. Congr. Bot. Vienne 344. 1906.

Uromyces scaber Ellis & Ev. Jour. Myc. **6**: 119. 1891.
Uredo Eriocomae Ellis, Jour. Myc. **7**: 275. 1893.
Puccinia substerilis Ellis & Ev. Bull. Torrey Club **22**: 58. 1895.
Uredo Eriocomae Ellis & Ev. Bull. Torrey Club **24**: 285. 1897.
Uredo luxurians Ellis & Ev. N. Am. Fungi *3583*. 1898.

O and I. Pycnia and aecia unknown.

II. Uredinia of the typical sort rarely seen, epiphyllous, scattered, elliptic or oblong, 0.5–1 mm. long, cinnamon-brown, early naked, pulverulent, ruptured epidermis noticeable; urediniospores globoid or broadly ellipsoid, 18–23 by 21–27 μ; wall golden- or pale cinnamon-brown, 1.5–2 μ thick, closely and conspicuously echinulate, the pores 4–6, scattered.

Uredinia of the modified sort (amphisori) common, persistent, epiphyllous, numerous, elliptic, or oblong-linear, 0.5–2 mm. long, early naked, somewhat pulverulent, dark chestnut-brown, pulvinate, ruptured epidermis noticeable; urediniospores of the modified sort (amphispores) ellipsoid or obovoid, 19–26 by 26–35 μ; wall dark cinnamon- or dark chestnut-brown, 2.5–3 μ thick, sometimes thicker at apex, 3–5 μ, moderately and strongly, occasionally finely echinulate, the pores 4–6, scattered, sometimes appearing equatorial; pedicel often persistent, fragile, colorless, twice to thrice length of spore.

III. Telia free from amphispores, rare or possibly not formed; teliospores few, oblong or ellipsoid, 16–24 by 30–45 μ, rounded or somewhat truncate above, seldom attenuate, rounded or tapering below, noticeably constricted at septum; wall golden- or cinnamon-brown, 1.5 μ thick, darker above, 3–7 μ; pedicel pale-yellow or colorless, as long as spore or longer.

ON POACEAE:
Oryzopsis hymenoides (R. & S.) Ricker (*O. cuspidata* Benth., *Eriocoma cuspidata* Nutt., *E. hymenoides* Rydb.), California, Colorado, Montana, Nevada, New Mexico, Utah.
Stipa Lettermani Vasey, Colorado, New Mexico.
Stipa minor (Vasey) Scribn., Colorado.
Stipa Nelsonii Scribn., Colorado.
Stipa Scribneri Vasey, Colorado, New Mexico.
Stipa Vaseyi Scribn. (*S. robusta* Scribn.), Colorado, New Mexico.
Stipa viridula Trin. (*S. spartea* Hook. not Trin.), Colorado, Montana, New Mexico, North Dakota, South Dakota, Wyoming; Manitoba.

TYPE LOCALITY: Swift Creek, Custer County, Colorado, on "leaves of some grass" [*Stipa viridula*].

DISTRIBUTION: Manitoba to Montana, southward to southern California, and New Mexico.

ILLUSTRATIONS: Bull. Lab. Nat. Hist. Univ. Iowa **4**: *pl. 7, f. 28a*.

EXSICCATI: Arth. & Holway, Ured. Exs. Ic. *28a;* Barth. N. Am. Ured. *63, 369, 573, 1668, 2072;* Barth. Fungi Columb. *3268, 3467, 5075;* Brenckle, Fungi Dak. *84;* Clements. Crypt. Form. Colo. *325;* Garrett, Fungi Utah. *240;* D. Griff. W. Am. Fungi *6, 175, 325;* Ellis & Ev. Fungi Columb. *548, 1192, 1662, 2161;* Ellis & Ev. N. Am. Fungi *3141, 3583;* Sydow, Ured. *2040*.

42. **Dicaeoma micranthum** (D. Griff.) Arthur & Fromme.

Puccinia micrantha D. Griff. Bull. Torrey Club **29**: 299. 1902.

O. Pycnia chiefly epiphyllous, grouped on yellowish spots 2–8 mm. across, noticeable, honey-yellow, flattened-globoid, 112–122 μ wide by 96 μ high; ostiolar filaments 90–112 μ long, agglutinated into a short column.

I. Aecia chiefly hypophyllous but also found on petioles and young fruit, crowded in groups 2–10 mm. across, cylindric, large, 0.3–0.5 mm. in diameter, 0.5–3.0 mm. high; peridium white, the margin erose, somewhat recurved; peridial cells rectangular or somewhat rhomboidal in radial longitudinal section, 16–19 by 26–32 μ, somewhat overlapping by a slight downward projection of the outer wall, the outer wall 8–12 μ thick, transversely striate, the inner wall thinner, 2–3 μ, closely verrucose; aeciospores globoid or angular, 15–18 by 16–25 μ; wall colorless, 1.5–2 μ thick, very closely and finely verrucose.

ON GROSSULARIACEAE:
Grossularia leptantha (A. Gray) Cov. & Britt. (*Ribes leptantha* A. Gray), Colorado.
Grossularia setosa (Lindl.) Cov. & Britt. (*Ribes setosum* Lindl.), South Dakota.

II. Uredinia epiphyllous, usually few, distinct, circular or oblong-elliptic, small, 0.2–0.3 mm. long, cinnamon-brown, early naked, ruptured epidermis inconspicuous; urediniospores globoid or broadly ellipsoid, 15–19 by 18–22 μ; wall light cinnamon-brown, 1.5 μ thick, finely and closely echinulate, the pores 6–8, scattered.

III. Telia epiphyllous, numerous, crowded and sometimes confluent, oblong or oblong-linear, 0.5–1 mm. long, early naked, pulvinate, dark chocolate-brown, ruptured epidermis inconspicuous; teliospores somewhat variable, obovoid to oblong-ellipsoid, 19–23 by 34–40 μ, rounded or attenuate above, rounded or tapering below, moderately or only slightly constricted at septum; wall chestnut-brown, 1–1.5 μ thick, 6–9 μ at apex, smooth; pedicel pale-yellow or nearly colorless, as long as spore.

ON POACEAE:
Oryzopsis micrantha (Trin. & Rupr.) Thurb., Colorado, Montana, Nebraska, South Dakota.
TYPE LOCALITY: Billings, Montana, on *Oryzopsis micrantha*.
DISTRIBUTION: Foothills of the Rocky Mountains and nearby plains from central Montana to southeastern Colorado.
ILLUSTRATIONS: Bull. Torrey Club **29**: 298, *f. 8*.
EXSICCATI: D. Griff. W. Am. Fungi *386*.

43. **Dicaeoma Sporoboli** (Arth.) Kuntze, Rev. Gen. **3**[3]: 470. 1898.

Puccinia Sporoboli Arth. Bull. Iowa Agr. Coll. Dep. Bot. **1884**: 159. 1884.

O. Pycnia few, scattered, inconspicuous, honey-yellow turning darker later, globose, 90–115 μ wide by 100–150 μ deep; ostiolar filaments protruding, up to 64 μ in length.

I. Aecia hypophyllous, in groups 2.5–3 mm. across, short-cupulate, 0.3–0.8 mm. in diameter; peridium honey-yellow, the margin recurved, lacerate; peridial cells linear-rhomboidal, 16–23 by 23–32 μ, considerably overlapping, the walls of about equal thickness, 5–7 μ, the inner one prominently verrucose, the outer one striate; aeciospores angularly globoid or ellipsoid, 16–18 by 21–26 μ; wall pale-yellow, 1 μ thick, very finely and inconspicuously verrucose, appearing almost smooth when wet.

ON LILIACEAE:
Allium sp., proven by cultures, not yet collected in the field.
Lilium umbellatum Pursh, Nebraska, North Dakota.

II. Uredinia amphigenous, scattered, oval or oblong, 0.5–0.7 mm. long; urediniospores 1blate-spheroid, 25–29 μ broad by 23–27 μ long; wall dark cinnamon-brown, moderately thin, 0.5–2 μ, moderately and finely echinulate, the pores 3, sometimes 4, basal, mostly near the hilum.

III. Telia amphigenous, numerous, crowded or scattered, often confluent, oblong or linear, 0.5–2 mm. long, early naked, pulvinate, blackish-brown, ruptured epidermis not conspicuous; teliospores oblong or ellipsoid, 15–21 by 27–48 μ, rounded above and sometimes narrowed below; wall dark chestnut-brown, rather thin, 1.5 μ, thickened up to 10 μ above, smooth; pedicel light cinnamon-brown, as long as spore.

ON POACEAE:
Sporobolus heterolepis A. Gray, Iowa, North Dakota.
TYPE LOCALITY: Decorah, Iowa, on *Sporobolus heterolepis*.
DISTRIBUTION: Locally on prairies from southern North Dakota to central Iowa and Nebraska.
ILLUSTRATION: Bull. Lab. Nat. Hist. Univ. Iowa **4**: *pl. 6, f. 25a*.
EXSICCATI: Arth. & Holway, Ured. Exs. Ic. *25a;* Brenckle, Fungi Dak. *344, 467*.

44. **Dicaeoma verbenicola** (Ellis & Kellerm.) Arth. Proc. Ind. Acad. Sci. **1903**: 151. 1904.

Aecidium verbenicola Ellis & Kellerm. Bull Torrey Club **11**: 114. 1884.
Puccinia Sydowiana Dietel, Hedwigia **36**: 299. 1897. Not *P. Sydowiana* Zopf, 1879.
Puccinia Vilfae Arth. & Holway, Bull. Iowa Lab. Nat. Hist. **4**: 388. 1898.
Dicaeoma Vilfae Arth. Proc. Ind. Acad. Sci. **1898**: 185. 1899.
Puccinia verbenicola Arth. Bot. Gaz. **35**: 16. 1903.

O. Pycnia mostly epiphyllous, few, in circular groups on discolored areas 2–5 mm. in diameter, honey-yellow becoming brownish, globose in vertical section, 90–110 μ broad; ostiolar filaments 20–45 μ long.

I. Aecia hypophyllous, in circular groups on discolored areas, 2–5 mm. in diameter, cupulate, 0.2–0.3 mm. broad; peridium colorless, fragile, margin slightly recurved; peridial cells oblong, 16–26 by 29–42 μ, abutted, the outer wall thick, 5–12 μ, smooth, transversely striate, the inner wall thinner, 3–7 μ, coarsely verrucose; aeciospores globoid or oblong, 18–23 by 23–31 μ; wall colorless, 1–1.5 μ thick, conspicuously thickened above, up to 12 μ, very inconspicuously verrucose.

ON VERBENACEAE:
Verbena angustifolia Michx., Kansas, Missouri.
Verbena bracteosa Michx., Nebraska.
Verbena canadensis (L.) Britton, Oklahoma.
Verbena hastata L., Kansas, South Dakota.
Verbena stricta Vent., Illinois, Indiana, Kansas, Nebraska, Oklahoma, South Dakota.
Verbena urticifolia L., Kansas, Nebraska, Oklahoma.

II. Uredinia epiphyllous, numerous, evenly distributed, oblong-linear, 0.5–1.5 mm. long, yellowish, early naked, ruptured epidermis conspicuous; urediniospores obovoid or ellipsoid, 21–27 by 26–35 μ; wall colorless, 1.5–2 μ thick, much thicker above, 5–10 μ, moderately and conspicuously verrucose-echinulate, the pores indistinct, 6–8, approximately equatorial.

III. Telia chiefly epiphyllous, numerous, scattered, elliptic, 0.5–1.5 mm. long, blackish-brown, early naked, pulvinate, compact, ruptured epidermis conspicuous; teliospores ellipsoid or oblong, 18–28 by 37–53 μ, rounded at both ends, or sometimes obtuse above and tapering below, slightly constricted at septum; wall chestnut-brown above, paler below, 1.5–2 μ thick, 5–9 μ at apex, smooth; pedicel colorless, stout, twice length of spore.

ON POACEAE:
Sporobolus asper (Michx.) Kunth (*S. longifolius* Wood), Alabama, Illinois, Indiana, Iowa, Kansas, Mississippi, Nebraska, Oklahoma, South Dakota, Tennessee, Wisconsin.
Sporobolus Drummondii (Trin.) Vasey, Kansas.
Sporobolus neglectus Nash, Nebraska.
TYPE LOCALITY: Manhattan, Kansas, on *Verbena urticifolia*.
DISTRIBUTION: Prairies from Wisconsin to South Dakota and southward to Alabama and Oklahoma.
ILLUSTRATIONS: Bull. Lab. Nat. Hist. Univ. Iowa **4**: *pl. 6, f. 26a–d.*
EXSICCATI: Arth. & Holway, Ured. Exs. Ic. *26a–d;* Barth. Fungi Columb. *2472, 3471, 3865;* Barth. N. Am. Ured. *274, 476, 670, 671, 771, 1779;* Carleton, Ured. Am. *21;* Ellis & Ev. N. Am. Fungi *2417, 3570;* Ellis & Ev. Fungi Columb. *48, 191, 270, 1189, 1383, 1869, 1977, 1978, 2074, 2163;* Ellis, N. Am. Fungi *1434a, b;* Rab.-Paz. Fungi Eur. *4226;* Seym. & Earle, Econ. Fungi *523;* Seym. & Earle, Econ. Fungi Suppl. *B19;* Sydow, Ured. *1032, 1200, 1280, 2131.*

45. **Dicaeoma** (?) **egenulum** (Arth.) Arthur & Fromme.

Uredo egenula Arth. Bull. Torrey Club **45**: 155. 1918.

O and I. Pycnia and aecia unknown.

II. Uredinia epiphyllous, numerous, scattered, oblong or linear, 0.2–1.2 mm. long, early naked, pulverulent, cinnamon-brown, ruptured epidermis evident; urediniospores globoid or broadly ellipsoid, 21–25 by 26–34 μ; wall cinnamon-brown, rather thick, 1.5–2.5 μ, moderately and noticeably echinulate, the pores 2, equatorial, prominent.

III. Telia unknown.

ON POACEAE:
Sporobolus argutus (Nees) Kunth, Jamaica.
TYPE LOCALITY: Below Gregory Park, Healthshire Hills, Halfmoon Bay, Jamaica.
DISTRIBUTION: Known only from the type locality.

46. **Dicaeoma simulans** (Peck) Arthur & Fromme.

Uromyces simulans Peck, Bot. Gaz. **4**: 127. 1879.
Puccinia Cryptandri Ellis & Barth. Erythea **5**: 47. 1897.
Dicaeoma Cryptandri Arth. Résult. Sci. Congr. Bot. Vienne 344. 1906.

O and I. Pycnia and aecia unknown.

II. Uredinia epiphyllous and caulicolous, numerous, crowded and often confluent, oblong-linear, 0.5–2 mm. long, early naked, pulverulent, dark cinnamon-brown, ruptured epidermis conspicuous; urediniospores ellipsoid or obovoid, 19–25 by 29–40 μ; wall cinnamon-brown, rather thick, about 2 μ, moderately and strongly echinulate, the pores distinct, 3 to 5, equatorial.

III. Telia epiphyllous, oblong, 0.5–2 mm. long, early naked, blackish-brown, ruptured epidermis conspicuous; teliospores ellipsoid or oblong, 24–32 by 40–50 μ, rounded at both ends, or sometimes obtuse above, only slightly constricted at septum; mesospores occasional; wall dark chestnut-brown, 3–4 μ thick at the sides, considerably thickened above, up to 9 μ; pedicel colorless, stout, twice length of spore or more.

This species is morphologically nearly identical with *Nigredo Sporoboli* (Ellis & Ev.) Arth., except in the presence of two-celled teliospores, and should eventually be incorporated with it under one name.

ON POACEAE:
Sporobolus contractus Hitchc. (*S. strictus* Merr. not Franchet), Colorado, New Mexico.
Sporobolus cryptandrus (Torr.) A. Gray, Colorado, Kansas, Montana, Nebraska, New Mexico, Oklahoma, South Dakota, Texas, Wyoming.
Sporobolus Wrightii Munro, Arizona.
Tridens strictus (Nutt.) Nash, Texas.
TYPE LOCALITY: Colorado, on "*Vilfa*," now determined as *Sporobolus cryptandrus*.
DISTRIBUTION: Plains from Montana southward to Arizona and Texas.
ILLUSTRATION: Bull. Lab. Nat. Hist. Univ. Iowa **4**: *pl. 6, f. 24a*.
EXSICCATI: Arth. & Holway, Ured. Exs. Ic. *24a;* Barth. Fungi Columb. *3550, 4847;* Barth. N. Am. Ured. *32, 541, 2035;* Ellis & Ev. Fungi Columb. *1378;* D. Griff. W. Am. Fungi *90, 255;* Sydow, Ured. *1172*.

47. **Dicaeoma luxuriosum** (Sydow) Arthur & Fromme.

Puccinia tosta luxurians Arth. Bull. Torrey Club **29**: 229. 1902.
Puccinia luxuriosa Sydow, Monog. Ured. **1**: 812. 1904.

O. Pycnia amphigenous, in small groups, crowded, punctiform, honey-yellow becoming dark-brown, flask-shaped or globoid in vertical section, 80–90 μ broad by 100–110 μ high; ostiolar filaments agglutinate.

I. Aecia amphigenous, frequently in small irregular groups or solitary, cylindric, usually short, 0.2–0.4 mm. high, 0.2–0.3 mm. broad; peridium yellowish-white, becoming irregularly lacerate; peridial cells rectangular or rhombic, 21–27 by 24–39 μ, slightly overlapping, the outer wall 9–13 μ thick, transversely striate, the inner wall 2–3 μ thick, very closely and noticeably verrucose; aeciospores broadly ellipsoid or oblong, 18–23 by 22–32 μ; wall thin, 1–2 μ, rarely thicker, very closely and inconspicuously verrucose.

ON CHENOPODIACEAE:
Sarcobatus vermiculatus (Hook.) Torr., Colorado, Nevada, New Mexico.

II. Uredinia mostly epiphyllous, few, scattered, oblong-linear, 0.5–1 mm. long, early naked, cinnamon-brown, ruptured epidermis inconspicuous; urediniospores ellipsoid or oblong, 19–24 by 26–32 μ; wall pale cinnamon-brown, 1.5–2 μ thick, finely and closely echinulate, the pores 6–8, scattered or often restricted to the equatorial zone.

III. Telia mostly epiphyllous, numerous, crowded and often confluent, oblong or linear, 0.5–3 mm. long, pulvinate, blackish-brown, early naked, ruptured epidermis inconspicuous; teliospores oblong or broadly ellipsoid, 18–28 by 40–61 μ; wall dark chestnut-brown, 1.5–2 μ thick, thickened at apex, 5–12 μ, rounded or acute above, rounded or tapering below; pedicel tinted, once or twice length of spore.

ON POACEAE:
Sporobolus airoides Torr., Arizona, Colorado, Idaho, Montana, Nebraska, Nevada, New Mexico, Oklahoma, Oregon.
TYPE LOCALITY: Andrews, Oregon, on *Sporobolus airoides*.
DISTRIBUTION: Montana to Oregon, and southward to Oklahoma, New Mexico, and Nevada.
EXSICCATI: Barth. Fungi Columb. *4374;* Barth. N. Am. Ured. *1059, 1257, 1949, 1950, 1951;* D. Griff. W. Am. Fungi *304, 304a*.

48. **Dicaeoma Sarcobati** (Peck) Arth. Résult. Sci. Congr. Bot. Vienne 344. 1906.

Aecidium biforme Peck; Parry, Am. Nat. **9**: 351. 1875. Not *Dicaeoma biforme* Kuntze, 1898.
Aecidium Sarcobati Peck, Bot. Gaz. **6**: 240. 1881.
?*Aecidium isomerinum* Peck, Bull. Torrey Club **10**: 75. 1883.
Peridermium gracile Hark. Bull. Calif. Acad. **1**: 36. 1884.
Aecidium Heliotropii Tracy & Gall. Jour. Myc. **4**: 21. 1888.
Aecidium Ellisii Tracy & Gall. Jour. Myc. **4**: 21. 1888.
Aecidium Lepidii Tracy & Gall. Jour. Myc. **4**: 21. 1888.
Aecidium Fumariacearum Kellerm. & Swingle, Jour. Myc. **4**: 95. 1888.
Puccinia Buchloës Schof.; Webber, Ann. Rep. Neb. Board Agr. **1889**: 68. 1890.
Aecidium Corydalis Webber, Ann. Rep. Neb. Board Agr. **1889**: 70. 1890.
Aecidium Cleomis Ellis & And. Bot. Gaz. **16**: 48. 1891.
Puccinia vexans Buchloës Webber; Sacc. Syll. Fung. **9**: 308. 1891.
Puccinia Aristidae Tracy, Jour. Myc. **7**: 281. 1893.
Puccinia subnitens Dietel, Erythea **3**: 81. 1895.
Dicaeoma Aristidae Kuntze, Rev. Gen. **3**^{3}: 467. 1898.
Aecidium Triglochinis Dietel & Holway; Holway, Erythea **7**: 98. 1899.
Aecidium caspicum Jacz. Hedwigia Beibl. **39**: 133. 1900.
Dicaeoma Buchloës Arth. Résult. Sci. Congr. Bot. Vienne 344. 1906.
Aecidium Cockerellii Arth.; Standley, Mycologia 8: 150. 1916.

O. Pycnia amphigenous, in small circular groups, crowded, punctiform, honey-yellow, submerged, globoid in vertical section, 100–160 μ in diameter; ostiolar filaments 30–60 μ long.

I. Aecia chiefly hypophyllous, also caulicolous, in irregular groups 2–3 mm. across, somewhat crowded, cylindric, 0.4–0.8 mm. high, 0.2–0.3 mm. broad; peridium yellowish, the margin dentate or becoming irregularly lacerate and slightly recurved; peridial cells irregularly oblong, 16–25 by 26–35 μ, overlapping and firmly united, the outer wall 7–14 μ, nearly smooth, transversely striate, the inner wall thinner, 2–5 μ, closely and finely or coarsely verrucose; aeciospores globoid or oblong, 13–21 by 15–23 μ; wall colorless, 1–3 μ, on fleshy-leaved hosts usually thin, 1–2 μ, closely and moderately verrucose, the pores usually indistinct, 6–8, scattered.

ON SCHEUCHZERIACEAE:
Triglochin maritima L. (*T. concinna* Davy, *T. elata* Nutt.), California, Colorado, Nevada.
Triglochin striata R. & P., Nevada.

ON POLYGONACEAE:
Eriogonum trichopodum Torr., Arizona.
Polygonum aviculare L. (*P. littorale* Link), Colorado, Delaware, Nebraska, North Dakota.
Polygonum erectum L., Colorado.
Rumex hymenosepalus Torr., Arizona.

ON CHENOPODIACEAE:
Atriplex hastata L. (*A. patula hastata* A. Gray), Delaware, Maine.
Atriplex rosea L., Colorado, New Mexico, Utah.
Atriplex Wolfii S. Wats., Colorado.
Beta vulgaris L., Colorado, Utah.
Blitum capitatum L., Colorado.
Chenopodium album L., Arizona, Colorado, Montana, Nebraska, New Mexico, North Dakota.
Chenopodium Fremontii S. Wats., New Mexico.
Chenopodium hybridum L., Colorado, Nebraska.
Chenopodium incanum (S. Wats.) Heller, Arizona.
Chenopodium leptophyllum Nutt., Nebraska.
Chenopodium murale L., Arizona, Utah.
Chenopodium pratericola Rydb., Colorado, Nebraska, New Mexico, Utah.
Chenopodium rubrum L., Arizona, Colorado, New Mexico.
Chenopodium salinum Standley (*C. glaucum* Am. Auct.), Colorado, Montana.
Dondia depressa (Pursh) Britton (*Suaeda depressa* S. Wats.), Colorado.
Dondia Torreyana (S. Wats.) Standley (*Suaeda Torreyana* S. Wats.), California.
Kochia Scoparia (L.) Schrad., Colorado, Nebraska.
Monolepis Nuttalliana (Schultes) Engelm., Colorado, Montana, North Dakota.
Nitrophila occidentalis (Nutt.) S. Wats., Nevada.
Salsola Pestifer A. Nelson (*S. Tragus* Reichenb. not L.), Colorado, Nebraska, New Mexico.
Sarcobatus vermiculatus (Hook.) Torr., Idaho, Montana, Nevada, Oregon, Utah, Washington, Wyoming.
Suckleya Suckleyana (Torr.) Rydb., Colorado.

ON AMARANTHACEAE:
Amaranthus sp., Colorado.

ON ALLIONIACEAE:
Abronia fragans Nutt., Colorado.
Abronia umbellata Lam., California.
Allionia comata Small (*A. melanotricha* Standley), Arizona, New Mexico.
Quamoclidion multiflorum Torr., Arizona.
Tripterocalyx micranthus (Torr.) Hook. (*Abronia micrantha* Torr.), Colorado.

ON ALSINACEAE:
Tissa macrotheca (Hornem.) Britton (*Spergularia macrotheca* Heynh.), California.

ON CARYOPHYLLACEAE:
Silene antirrhina L., Arizona.
Vaccaria Vaccaria (L.) Britton (*Saponaria Vaccaria* L.) Colorado.

ON FUMARIACEAE:
Capnoides micranthum (Engelm.) Britton (*Corydalis micrantha* A. Gray), Nebraska.
Capnoides montanum (Engelm.) Britton (*Corydalis montana* Engelm., *C. aurea occidentalis* Engelm.), Kansas, Nebraska.

ON BRASSICACEAE:
Brassica juncea (L.) Cosson, Colorado.
Bursa Bursa-pastoris (L.) Britton (*Capsella Bursa-pastoris* Medic.), Colorado, Nebraska.
Cheirinia aspera (Nutt.) Rydb. (*Erysimum asperum* DC.), North Dakota.
Draba cuneifolia Nutt., Arizona.
Draba sp., New Mexico.
Lepidium alyssoides A. Gray, Colorado.
Lepidium densiflorum Schrad. (*L. apetalum* A. Gray), Colorado, Montana, Nebraska, North Dakota.
Lepidium lasiocarpum Nutt., Arizona.
Lepidium montanum Nutt., Utah.
Lepidium perfoliatum L., Utah.
Lepidium sp., Kansas, New Mexico.
Lesquerella Gordoni (A. Gray) S. Wats., Arizona.

Musineon divaricatum (Pursh) Coult. & Rose, South Dakota.
Norta altissima (L.) Britton (*Sisymbrium altissimum* L.), Colorado.
Radicula sinuata (Nutt.) Greene (*Roripa sinuata* Hitchc., *Nasturtium sinuatum* Nutt.), Colorado, Nebraska.
Sisymbrium Nasturtium-aquaticum L. (*Nasturtium officinale* R. Br.), Arizona.
Sophia andrenarum Cockerell, New Mexico.
Sophia incisa (Engelm.) Greene (*Sisymbrium incisum* Engelm.), Colorado,
Sophia intermedia Rydb., Colorado, Nebraska.
Sophia sp., Nevada.
Stanleya pinnata (Pursh) Britton (*S. pinnatifida* Nutt.), Colorado.
Thelypodium laciniatum Endl., California.
Thelypodium sagittatum (Nutt.) Endl., Neveda.

ON CAPPARIDACEAE:
Cleomella Montrosae Payson, Colorado.
Cleomella parviflora A. Gray, Nevada.
?*Isomeris arborea* Nutt., California.
Peritoma serrulatum (Pursh) DC. (*Cleome serrulata* Pursh, *C. integrifolia* T. & G.), Arizona, Colorado, Montana, Nebraska, New Mexico.
Peritoma Sonorae (A. Gray) Rydb. (*Cleome Sonorae* A. Gray), Colorado.

ON TROPAEOLACEAE:
Tropaeolum majus L., Utah.

ON LOASACEAE:
Mentzelia sp., Colorado.

ON ONAGRACEAE:
Chylismia scapoidea Nutt. (*Oenothera scapoidea* Nutt.), Nevada.
Sphaerostigma chamaenerioides (A. Gray) Small, Arizona.

ON PRIMULACEAE:
Glaux maritima L., Saskatchewan.

ON GENTIANACEAE:
Centaurium calycosum (Buckl.) Fernald, New Mexico.

ON POLEMONIACEAE:
Gilia inconspicua (J. E. Smith) Dougl., Arizona.
Linanthus Bigelovii (A. Gray) Greene (*Gilia Bigelovii* A. Gray), Arizona.

ON HYDROPHYLLACEAE:
Phacelia crenulata Torr., Arizona.

ON HELIOTROPIACEAE:
Heliotropium xerophilum Cockerell (*H. spathulatum* Rydb.), Arizona, California, New Mexico, Utah.

ON BORAGINACEAE:
Amsinckia Menziesii (Lehm.) Nels. & Macbr. (*A. intermedia* A. Gray), Nevada.
Cryptantha barbigera (A. Gray) Greene (*Krynitzkia barbigera* A. Gray), Arizona.
Cryptantha pterocarya (Torr.) Greene, Arizona.
Lappula heterosperma Greene, Arizona.
Lappula occidentalis (S. Wats.) Greene, Arizona.
Pectocarya linearis (R. & P.) DC., Arizona.

ON VERBENACEAE:
Verbena ciliata Benth., Arizona.

ON SOLANACEAE:
Chamaesaracha Coronopus (Dunal) A. Gray, New Mexico.
Datura meteloides DC., Arizona.
Nicotiana trigonophylla Dunal, Arizona.
Petunia parviflora Juss., Arizona.
Quincula lobata (Torr.) Raf. (*Physalis lobata* Torr.), Colorado.

ON LOBELIACEAE:
Nemocladus ramosissimus Nutt., Arizona.

II. Uredinia epiphyllous, seldom hypophyllous, scattered or crowded, small, about 0.5 mm. long, dark cinnamon-brown, ruptured epidermis conspicuous; urediniospores globoid or broadly ellipsoid, 18–24 by 19–30 μ; wall moderately thick, 2–3 μ, golden- or light cinnamon-brown, finely verrucose, the pores 4–6, usually equatorial, or one apical and the others equatorial, or more or less scattered.

III. Telia mostly epiphyllous, numerous, often confluent, oblong, 0.5–2 mm. long, early naked, pulvinate, dark chocolate-brown, ruptured epidermis usually inconspicuous; teliospores broadly ellipsoid, oblong or obovoid-oblong, 18–28 by 27–45 μ, rounded, obtuse or somewhat attenuate above, rounded or tapering below, moderately constricted at septum; wall chestnut-brown, 1.5–2 μ thick, 6–12 μ at apex, smooth; mesospores common, somewhat narrower and shorter than the telisopores; pedicel about twice length of spore, tinted only at attachment.

The species is composed of several ill defined races as shown by cultures. Morphologically it is not distinguishable from *Nigredo Peckiana* (Farl.) Arth. except in the predominance of two-celled teliospores. The two forms are separately maintained for convenience but should eventually be united under one name.

ON POACEAE:
?*Aristida Adscensionis* L. (*A. bromoides* H.B.K.), California, New Mexico; Coahuila, Jalisco.
Distichlis spicata (L.) Greene (*D. maritima* Raf.), Arizona, California, Colorado, Delaware, Idaho, Kansas, Maine, Montana, Nebraska, Nevada, New Mexico, North Dakota, Oklahoma, Oregon, South Dakota, Texas, Utah, Washington, Wyoming; Saskatchewan.
?*Pleuraphis Jamesii* Torr. (*Hilaria Jamesii* Benth.), Arizona.
?*Pleuraphis rigida* Thurb. (*Hilaria rigida* Benth.), Nevada.

TYPE LOCALITY: [Frisco], Utah, on *Sarcobatus vermiculatus*.

DISTRIBUTION: Abundant on alkaline soil from North Dakota to Saskatchewan and southward to Utah, western Texas, and central Mexico, and sparingly on the Atlantic coast fromMaine to Delaware and on the Pacific coast from Washington to southern California; also in South America, Asia, and Africa.

ILLUSTRATIONS: Bull. Lab. Nat. Hist. Univ. Iowa **5**: *pl. 1, f. 46a, b*.

EXSICCATI: Arth. & Holway, Ured. Exs. Ic. *46a, b;* Barth. Fungi Columb. *3267, 3769, 3802, 3846, 4163, 4371;* Barth. N. Am. Ured. *62, 265, 570, 571, 572, 643, 704, 767, 1175, 1271, 1272, 1870, 1871, 1872, 1967, 1968, 2062, 2063, 2064, 2065, 2066, 2067, 2068, 2069, 2070, 2071;* Brenckle, Fungi Dak. *47, 130, 204;* Clements, Crypt. Form. Colo. *578;* Ellis & Ev. N. Am. Fungi *1822, 3047;* Ellis & Ev. Fungi Columb. *348, 1501, 1976, 2073;* Garrett, Fungi Utah. *169;* D. Griff. W. Am. Fungi *38, 359;* Rab.-Wint. Fungi Eur. *3634;* Seym. & Earle, Econ. Fungi *536;* Sydow, Ured. *1279, 2279, 2433;* Vesterg. Micr. Rar. Sel. *853;* Zahlbr. Krypt. *2008*.

49. **Dicaeoma hibisciatum** (Schw.) Arth. Résult. Sci. Congr. Bot. Vienne 344. 1906.

Caeoma (*Aecidium*) *hibisciatum* Schw. Trans. Am. Phil. Soc. II. **4**: 293. 1832.
Aecidium (*Caeoma*) *hibisciatum* Schw. Trans. Am. Phil. Soc. II. **4**: 309. 1832.
Aecidium Napaeae Arth. & Holway; Arth. Bull. Iowa Agr. Coll. Dep. Bot. **1884**: 166. 1884.
Puccinia Windsoriae Burrill, Bull. Ill. Lab. Nat. Hist. **2**: 197. 1885. Not *P. Windsoriae* Schw. 1832.
Aecidium Callirrhoës Ellis & Kellerm. Jour. Myc. **2**: 4. 1886.
Puccinia Schedonnardi Kellerm. & Swingle, Jour. Myc. **4**: 95. 1888.
Aecidium Malvastri Ellis & Tracy, Jour. Myc. **7**: 43. 1881.
Aecidium Sphaeralceae Ellis & Ev. Bull. Torrey Club **22**: 364. 1895.
Puccinia Triodiae Ellis & Barth. Erythea **4**: 3. 1896.
Aecidium Gossypii Ellis & Ev. Erythea **5**: 6. 1897.
Dicaeoma Schedonnardi Kuntze, Rev. Gen. **3**^{3}: 470. 1898.
Dicaeoma Triodiae Kuntze, Rev. Gen. **3**^{3}: 471. 1898.
Puccinia Epicampes Arth. Bull. Torrey Club. **28**: 662. 1901.
Puccinia Muhlenbergiae Arth. & Holway, Bull. Lab. Nat. Hist. Univ. Iowa **5**: 317. 1902.
Puccinia tosta Arth. Bull. Torrey Club **29**: 228. 1902.
Puccinia hibisciata Kellerm. Jour. Myc. **9**: 110. 1903.
Aecidium malvicola Arth. Bull. Torrey Club **31**: 6. 1904.
Dicaeoma Muhlenbergiae Arth. Proc. Ind. Acad. Sci. **1903**: 148. 1904.

O. Pycnia amphigenous, few, in small crowded groups on discolored spots, honey-yellow becoming brownish, globose in vertical section, 90–140 μ in diameter; ostiolar filaments 40–100 μ long.

I. Aecia hypophyllous, in circular groups 4–10 mm. in diameter, surrounding the pycnia, cupulate or short-cylindric, small, 0.3–0.4 mm. broad; peridium low, yellowish or colorless, the margin lacerate and recurved; peridial cells quadratic or oblong, 18–26 by 21–35 μ, overlapping, the outer wall thick, 7–14 μ, smooth and striate, the inner wall thinner, 3–7 μ, coarsely verrucose; aeciospores globoid or broadly oblong, 15–21 by 16–26 μ; wall colorless or very light-yellow, somewhat variable in thickness, 1–3 μ, finely and inconspicuously verrucose, often appearing smooth.

ON MALVACEAE:
Abutilon sp., Nuevo León.
Althaea rosea L., Nebraska.
Callirhoë alceoides (Michx.) A. Gray, Colorado, Kansas, Nebraska.
Callirhoë digitata Nutt., Oklahoma.
Callirhoë involucrata (T. & G.) A. Gray, Kansas, Nebraska, Oklahoma.
Gossypium hirsutum L., Texas; Lower California.
Gossypium sp., Mexico (state).
Hibiscus lasiocarpus Cav., Illinois.
Hibiscus militaris Cav., Illinois, Nebraska, Pennsylvania.
Hibiscus Moscheutos L., Alabama, Missouri, North Carolina, Ohio.
Malvastrum coccineum (Pursh) A. Gray, Colorado, Kansas, Montana, Nebraska, North Dakota.
Malvastrum fasciculatum (Nutt.) Greene, California.
Malvaviscus acerifolius Presl, Hidalgo, Jalisco.
Napaea dioica L., Indiana, Iowa.
Sida hederacea (Dougl.) Torr., New Mexico.
Sidalcea candida A. Gray, Colorado.
Sphaeralcea lobata Wooton, New Mexico.

II. Uredinia amphigenous, few, intercostal or scattered, oblong or linear, small, 0.3–0.7 mm. long, early naked, light cinnamon-brown, pulverulent, ruptured epidermis not apparent; urediniospores globoid, broadly ellipsoid or obovoid, 18–26 by 19–30 μ; wall light cinnamon-brown, moderately thick, 1.5–2.5 μ, finely and moderately echinulate, the pores 6–8, scattered.

III. Telia amphigenous, numerous, often crowded, rounded, elliptic or linear, 0.3–1 mm. long, early naked, dark chocolate-brown, pulvinate, ruptured epidermis inconspicuous; teliospores oblong or broadly ellipsoid, 16–26 by 24–45 μ, rounded at both ends or sometimes obtuse above, only slightly if at all constricted at septum; mesospores sometimes present, 18–21 by 23–29 μ; wall dark chestnut-brown, 1.5–2.5 μ thick, moderately thickened at apex, 3–9 μ; pedicel light-golden, once to thrice length of spore.

ON POACEAE:
Epicampes rigens Benth., California, New Mexico.
Melica mutica Walt. (*M. diffusa* Pursh), Indiana.
Melica Porteri Scribn., Colorado.
Monanthochloë littoralis Engelm., Texas.
Muhlenbergia cuspidata (Torr.) Rydb. (*Sporobolus cuspidatus* Wood), Iowa, Nebraska, North Dakota, South Dakota.
Muhlenbergia filiformis (Thurber) Rydb., New Mexico.
Muhlenbergia gracillima Torr., Colorado.
Muhlenbergia mexicana (L.) Trin., Illinois, Indiana, Iowa, Kansas, Kentucky, Maryland, Nebraska, New York, Ohio, Oklahoma, Pennsylvania, Tennessee, Virginia, West Virginia, Wisconsin.
Muhlenbergia parviglumis Vasey, Texas.
Muhlenbergia plumbea (Trin.) Hitchc., Mexico (state).
Muhlenbergia Porteri Scribn., Arizona.
Muhlenbergia racemosa (Michx.) B.S.P. (*M. glomerata* Trin.), Indiana, Kansas, Nebraska, North Dakota, South Dakota.
Muhlenbergia repens (Presl) Hitchc. (*Sporobolus repens* Presl, *S. utilis* Torr.), New Mexico, Texas.
Muhlenbergia Richardsonii (Trin.) Rydb., Montana, North Dakota.
Muhlenbergia Schreberi Gmel. (*M. diffusa* Willd.), Arkansas, Delaware, Illinois, Indiana, Iowa, Kansas, Nebraska, New Jersey, New York, North Carolina, Ohio, Pennsylvania, West Virginia.
Muhlenbergia sobolifera (Muhl.) Trin., Indiana.
Muhlenbergia squarrosa (Trin.) Rydb. (*M. Richardsonii* Rydb., *Sporobolus depauperatus* Scribn. not *Muhlenbergia depauperata* Scribn.), Arizona, Montana, New Mexico, Utah.
Muhlenbergia tenuiflora (Willd.) B.S.P., Indiana.
Muhlenbergia trifida Hack., Colorado, New Mexico, Utah.
Muhlenbergia umbrosa Scribn. (*M. sylvatica* Torr.), Virginia.
Schedonnardus paniculatus (Nutt.) Trel. (*S. texanus* Steud.), Colorado, Kansas, Nebraska, South Dakota.
Sporobolus airoides Torr., North Dakota.
Sporobolus asperifolius (Nees & Meyen) Thurber, Colorado, Kansas, Montana, Nebraska, New Mexico, North Dakota, Texas, Utah.
Sporobolus auriculatus Vasey, Texas.
Triplasis purpurea (Walt.) Chapm. (*Triodia purpurea* Hack., *Tricuspis purpurea* A. Gray), Kansas, Oklahoma, Texas.

TYPE LOCALITY: Bethlehem, Pennsylvania, on *Hibiscus militaris*.

DISTRIBUTION: Throughout the United States, with the exception of the northern Pacific slope, and extending to southern Mexico.

ILLUSTRATIONS: Bull. Lab. Nat. Hist. Univ. Iowa **5**: *pl. 2, 3, f. 50a–e, pl. 7, f. 57a, b.*

EXSICCATI: Arth. & Holway, Ured. Exs. Ic. *50a–e, 57a, b;* Barth. N. Am. Ured. *49, 248, 249, 364, 365, 372, 471, 557, 665, 754, 1078, 1603, 1649, 1768, 1971, 2050, 2157, 2257;* Barth. Fungi Columb. *2362, 2471, 2670, 2860, 3263, 3264, 3573, 3853, 3949, 4373, 4858;* Brenckle, Fungi Dak. *46, 110, 116;* Clements, Crypt. Form. Colo. *597;* Ellis & Ev. Fungi Columb. *871, 987, 1297, 1377, 1393, 1467, 1668, 1768, 1773, 1905, 2065, 2162;* Ellis & Ev. N. Am. Fungi *1830, 1854, 2886, 3345, 3474;* Garrett, Fungi Utah. *59, 60;* D. Griff. W. Am. Fungi *96, 296, 301, 302, 303;* Kellerm. Ohio Fungi *82, 108, 109;* Kellerm. & Swingle, Kans. Fungi *16, 26, 44;* Rab.-Wint.-Paz. Fungi Eur. *4220;* Sydow, Ured. *1068, 1081, 1173, 1245, 1727, 1900, 2321, 2334, 2384;* Vesterg. Micr. Rar. Sel. *1103;* Zahlbr. Krypt. *2011a, b.*

50. **Dicaeoma dochmium** (Berk. & Curt.) Kuntze, Rev. Gen. **3**[3]: 468. 1898.

Puccinia dochmia Berk. & Curt. Proc. Am. Acad. **4**: 126. 1858.
Puccinia Windsoriae australis F. W. Anderson, Jour. Myc. **6**: 123. 1891.

O and I. Pycnia and aecia unknown.

II. Uredinia amphigenous, few, scattered, rounded or elliptic, small, 0.3–0.5 mm. long, early naked, pulverulent, cinnamon-brown, ruptured epidermis inconspicuous; urediniospores globoid, 18–23 by 19–27 μ; wall thin, 1–1.5 μ, golden- to light cinnamon-brown, fine y echinulate, the pores 6, sometimes inconspicuous, scattered.

III. Telia amphigenous, scattered, seldom confluent, broadly elliptic, small, 0.3–0.5 mm. long, early naked, dark chocolate-brown, pulvinate, ruptured epidermis inconspicuous; teliospores globoid or broadly ellipsoid, 21–25 by 26–32 μ, both ends rounded, not constricted at septum, the septum sometimes oblique or vertical; wall dark chestnut-brown, 2–2.5 μ thick, slightly thickened at apex, 3–7 μ; pedicel light golden- or pale cinnamon-brown, two or three times length of spore, sometimes attached laterally or at an angle.

ON POACEAE:
Muhlenbergia ciliata (H.B.K.) Kunth, Jalisco, Oaxaca; Guatemala.
Muhlenbergia implicata (H.B.K.) Kunth, Mexico (state).
Muhlenbergia quitensis (H.B.K.) Hitchc., Guatemala.
Muhlenbergia tenella (H.B.K.) Trin.. Jalisco; Costa Rica
Muhlenbergia sp., Nicaragua.
Pereilema crinitum Presl, Jalisco, Morelos.
TYPE LOCALITY: Nicaragua, on *Muhlenbergia* sp.
DISTRIBUTION: From south-central Mexico through Central America.
ILLUSTRATIONS: Bull. Lab. Nat. Hist. Univ. Iowa **5**: 316, *f. 1; pl. 2, f, 49a, b.*
EXSICCATI: Arth. & Holway, Ured. Exs. Ic. *49a, b.*

51. **Dicaeoma** (?) **Triniochloae** (Arth. & Holway) Arthur & Fromme.

Uredo Triniochloae Arth. & Holway, Am. Jour. Bot. **5**: 538. 1918.

O and I. Pycnia and aecia unknown.

II. Uredinia chiefly epiphyllous, numerous, small, elliptic, 0.2–0.5 mm long, soon naked, yellowish, pulverulent, ruptured epidermis inconspicuous; paraphyses numerous, erect, clavate or capitate, unusually large, 10–29 by 58–98 μ, the wall yellowish, of uniform thickness, 1–2 μ, or slightly thicker above; urediniospores ellipsoid or obovoid, 16–19 by 19–26 μ; wall thin, about 1 μ, yellowish or pale cinnamon-brown, finely and closely echinulate, the pores obscure, about 4–6, scattered, sometimes appearing equatorial.

III. Telia unknown.

ON POACEAE:
Triniochloa stipoides (H.B.K.) Hitchc. (*Muhlenbergia stipoides* Kunth, *Avena stipoides* Scribn.), Guatemala.
TYPE LOCALITY: San Rafael, Department of Guatemala, Guatemala, on *Triniochloa stipoides*.
DISTRIBUTION: Known only from the type locality.

52. **Dicaeoma amphigenum** (Dietel) Kuntze, Rev. Gen. **3**[3]: 467. 1898.

Puccinia amphigena Dietel, Hedwigia **34**: 291. 1895.

O. Pycnia amphigenous, numerous, in irregular groups or somewhat diffused, minute, punctiform, pale-yellow, becoming dark-brown, immersed, globose in vertical section, 80–100 μ in diameter; ostiolar filaments 50–65 μ high.

I. Aecia hypophyllous, in somewhat crowded groups 5–10 mm. in diameter, on discolored spots, cupulate, small, 0.3–0.4 mm. broad; peridium short, yellowish, slightly recurved; peridial cells oblong, 16–23 by 23–29 μ, overlapping and strongly imbricate, the outer wall smooth, 5–7 μ thick, transversely striate, the inner wall 3 μ thick, evenly verrucose; aeciospores globoid or oblong, 16–23 by 19–26 μ; wall pale-yellow, 1.5 μ thick, finely and evenly verrucose.

ON LILIACEAE:
Leucocrinum montanum Nutt., Colorado.
ON SMILACEAE:
Smilax herbacea L., Kansas, North Dakota; Manitoba.
Smilax hispida Muhl., Illinois, Kansas, Nebraska.

II. Uredinia amphigenous, few, scattered, narrowly oblong, 0.5–2 mm. long, early naked, cinnamon-brown, pulverulent, ruptured epidermis conspicuous; urediniospores globoid or broadly ellipsoid, 18–23 by 21–26 μ; wall cinnamon-brown, 1.5–2 μ thick, finely and closely echinulate, the pores about 8, scattered.

III. Telia amphigenous, numerous, crowded and often confluent, oblong or oblong-linear, 0.5–3 mm. long, early naked, blackish-brown, ruptured epidermis conspicuous; teliospores oblong or oblong-clavate, 18–32 by 30–56 μ, rounded or less often truncate or attenuate above, usually narrowed below, only slightly constricted at septum; wall dark chestnut-brown, 1–1.5 μ thick, 7–10 μ at apex; pedicel golden- or pale cinnamon-brown, once length of spore or less.

ON POACEAE:
Calamovilfa longifolia (Hook.) Hack. (*Ammophila longifolia* Benth.), Colorado, Illinois, Kansas, Michigan, Montana, Nebraska, North Dakota, Oklahoma, South Dakota, Wyoming; Manitoba, Ontario.

TYPE LOCALITY: Chicago, Illinois, On "*Calamagrostis canadensis*," error for *Calamovilfa longifolia*.

DISTRIBUTION: Plains and prairies from the eastern shores of Lake Huron to Manitoba and Montana, and southward to Oklahoma.

ILLUSTRATIONS: Bull. Lab. Nat. Hist. Univ. Iowa 5: *pl. 3, f. 51a–c.*

EXSICCATI: Arth. & Holway, Ured. Exs. Ic. *51a–c;* Barth. N. Am. Ured. *120, 923, 1217, 2135;* Barth. Fungi Columb. *4349, 5050;* Brenckle, Fungi Dak. *80;* Ellis & Ev. Fungi Columb. *1567, 2159;* D. Griff. W. Am. Fungi *98*; Seym. & Earle, Econ. Fungi *88;* Sydow, Ured. *910, 2306.*

53. **Dicaeoma pygmaeum** (Eriksson) Arthur & Fromme.

Puccinia pygmaea Eriksson, Fungi. Paras. Scand. *449.* 1895.
Puccinia Milii Eriksson, Fungi Paras. Scand. *450.* 1895.
Dicaeoma Milii Arth. Résult. Sci. Congr. Bot. Vienne 344. 1906.

O and I. Pycnia and aecia unknown.

II. Uredinia chiefly epiphyllous, numerous, scattered or in elliptic groups on discolored spots, small, elliptic or oblong, 0.3–0.5 mm. long, soon naked, pale cinnamon-brown, ruptured epidermis not conspicuous; paraphyses numerous, intermixed, capitate, 13–21 μ broad above by 42–96 μ long or less, the wall variable in thickness, 1.5–4 μ, pale-yellow or colorless, smooth; urediniospores broadly ellipsoid or ellipsoid, 19–29 by 21–35 μ; wall golden- or cinnamon-brown, thin, 1.5 μ, finely and rather closely echinulate, the pores somewhat indistinct, usually 8, scattered.

III. Telia hypophyllous, scattered, oblong or linear, 0.5–1.5 mm. in length, long covered by the epidermis, compact, dark-gray; teliospores clavate or cylindric, 12–21 by 29–51 μ, truncate above, narrowed below, slightly or not constricted at septum; wall chestnut-brown, thin, about 1 μ, slightly thickened above, 3–5 μ; pedicel very short, dark chestnut-brown.

ON POACEAE:
Arctagrostis arundinacea (Trin.) Beal, Alaska.
Calamagrostis aleutica Bong., Alaska, Oregon.
Calamagrostis canadensis (Michx.) Beauv., Michigan, Wisconsin.
Milium effusum L., Wisconsin.
Oryzopsis asperifolia Michx., Wisconsin; Ontario.

TYPE LOCALITY: Borgholm, Sweden, on *Calamagrostis epigeios.*

DISTRIBUTION: From southern Ontario to Wisconsin northward, and on the Pacific coast from Oregon to Bering Straits; also in Europe.

ILLUSTRATIONS: Krypt.-fl. Brand. Pilze 3: *f. B191.*

54. **Dicaeoma holcinum** (Eriksson) Arthur & Fromme.

Puccinia holcina Eriksson, Ann. Sci. Nat. VIII. 9: 274. 1899.

O and I. Aecia and pycnia unknown.

II. Uredinia amphigenous, scattered, elliptic or oblong-linear, small, 0.3–0.5 mm. long, early naked, cinnamon-brown, pulverulent, ruptured epidermis apparent; paraphyses none; urediniospores globoid, 19–24 by 23–27 μ; wall thin, 1–1.5 μ, yellowish or pale golden-brown, finely and closely echinulate, the pores 6–8, scattered, rather indistinct.

III. Telia chiefly hypophyllous, especially abundant on the sheaths, scattered, seldom confluent, oblong, 0.5–1.5 μ long, dark grayish-black, long covered by the epidermis, accompanied by a dark hyphal stroma; teliospores cuneate or oblong-clavate, 18–29 by 35–64 μ, truncate or rounded above, usually narrowed below, slightly or moderately constricted at septum; wall smooth, chestnut-brown, rather thin, about 1.5 μ, darker and thicker above, 4–7 μ; pedicel short, deciduous, concolorous with base of spore.

ON POACEAE:
Notholcus lanatus (L.) Nash (*Holcus lanatus* L.), California, Massachusetts, New York, Oregon, Washington; British Columbia.

TYPE LOCALITY: Stockholm, Sweden, on *Holcus lanatus.*

DISTRIBUTION: Naturalized along the Pacific coast from southern California to British Columbia and at Woods Hole, Massachusetts, and eastern end of Long Island, New York; also in northern Europe.

EXSICCATI: Barth. Fungi Columb. *3172, 3173, 4059, 4267, 4852, 5063;* Barth. N. Am. Ured. *41, 851, 1763, 1947.*

55. **Dicaeoma monoicum** (Peck) Arthur & Fromme.

Aecidium monoicum Peck, Bot. Gaz. **4**: 230. 1879.
Aecidium auriellum Peck, Bull. Torrey Club **10**: 74. 1883.
Aecidium Drabae Tracy & Gall. Jour. Myc. **4**: 21. 1888.
Puccinia monoica Arth. Mycologia **4**: 61. 1912.

O. Pycnia amphigenous, preceding or among the aecia, thickly scattered over large areas, rather prominent, honey-yellow becoming brownish, entirely immersed, flattened-globose, 90–160 μ in diameter by 60–112 μ high; ostiolar filaments 30–90 μ long.

I. Aecia chiefly hypophyllous, thickly and evenly distributed over large areas, often occupying the entire under surface of the leaves, cupulate or short-cylindric, 0.3–0.5 mm. broad; peridium pale-yellow or colorless, margin erect or spreading, somewhat lacerate; peridial cells oblong or quadratic, 16–24 by 26–37 μ, often abutted and sometimes overlapping, the outer wall thick, 7–14 μ, smooth and transversely striate, the inner wall thinner, 3–5 μ, coarsely verrucose; aeciospores globoid or ellipsoid, 15–24 by 17–30 μ; wall colorless, 1.5–2.5 μ thick, finely and closely verrucose.

ON BRASSICACEAE:
Arabis canescens Nutt., Colorado.
Arabis connexa Greene, Colorado.
Arabis Crandallii B. L. Robinson, Colorado.
Arabis Cusickii S. Wats., Washington.
Arabis Drummondii A. Gray (*A. oxyphylla* Greene), Colorado, New Mexico, Utah.
Arabis exilis A. Nelson, Montana.
Arabis Fendleri (S. Wats.) Greene, Colorado, New Mexico.
Arabis lignifera A. Nelson, Colorado.
Arabis Lyallii S. Wats., Montana.
Arabis lyrata L., Wisconsin; Ontario.
Arabis ovata (Pursh) Poir. (*A. hirsuta* Hook. not Scop.), Colorado, Nevada.
Arabis platysperma A. Gray, California.
Arabis retrofracta Graham (*A. Kochii* Blankinship, *A. Holboellii* Am. Auct.), Colorado, Montana, Utah; British Columbia.
Arabis Selbyi Rydb., Colorado.
Arabis Whitedii Piper, Washington.
Arabis sp., Arizona, Idaho, Minnesota, North Dakota; Manitoba, Saskatchewan.
Draba sp., New Mexico.
Phoenocaulis cheiranthoides Nutt. (*Arabis Menziesii* Hook., *Parrya Menziesii* Greene, *Cheiranthus Menziesii* Benth. & Hook.), Nevada.
Phoenocaulis pedicellata (A. Nelson) Heller (*Arabis pedicellata* A. Nelson), Nevada.
Schoenocrambe linifolia (Nutt.) Greene (*Sisymbrium linifolium* Nutt.), Colorado, Montana, Utah, Wyoming.
Schoenocrambe pinnata Greene, Colorado.
Smelowskia calycina (Desv.) C. A. Mey. (*S. americana* Rydb.), Wyoming.
Sophia incisa (Engelm.) Greene (*Sisymbrium incisum* Engelm.), New Mexico.
Sophia leptostylis Rydb., Utah.
Sophia pinnata (Walt.) Howell (*Sisymbrium canescens* Nutt.), Colorado.

II. Uredinia mostly epiphyllous, elliptic or oblong-linear, 1–3 mm. long, dark cinnamon-brown, early naked, pulverulent, ruptured epidermis conspicuous; urediniospores ellipsoid or obovoid, 19–27 by 24–31 μ; wall cinnamon-brown, about 2 μ thick, closely and finely echinulate, the pores 6–8, scattered.

III. Telia mostly epiphyllous, crowded and sometimes confluent, elliptic or oblong, 1–3 mm. long, early naked, chestnut-brown or cinerous by germination at maturity, pulvinate, ruptured epidermis conspicuous; teliospores ellipsoid or clavate-oblong, 16–24 by 34–55 μ, usually rounded at both ends, sometimes acute above and tapering below, slightly or moderately constricted at septum; wall cinnamon- or chestnut-brown, smooth, 1–1.5 μ thick, 5–10 μ above; pedicel colorless or nearly so, sometimes tinted at attachment, once to twice length of spore.

ON POACEAE:
Koeleria cristata (L.) Pers., Colorado, New Mexico, Wyoming.
Trisetum spicatum (L.) Richter (*T. subspicatum* Beauv.), Colorado, Utah.

TYPE LOCALITY: Colorado, on *Arabis retrofracta*.

DISTRIBUTION: Ontario and Wisconsin westward to British Columbia and southward to New Mexico.

EXSICCATI: Barth. N. Am. Ured. *835, 1164, 1956;* Ellis & Ev. N. Am. Fungi *2889a;* Garrett, Fungi Utah. *75, 194*.

56. **Dicaeoma leptosporum** (Ricker) Arthur & Fromme.

Puccinia leptospora Ricker, Jour. Myc. **11**: 114. 1905.

O, I, and II. Pycnia, aecia, and uredinia unknown.

III. Telia chiefly hypophyllous, scattered or somewhat grouped, broadly oblong, 0.5–2 mm. long, early naked, pulvinate, very compact, blackish-brown, ruptured epidermis apparent; teliospores elongate-clavate, 16–21 by 65–112 μ, 2–4-celled; upper cell short, about one-third the total spore-length in the 2–celled spores, truncate above, conspicuously coronate with 2–6 digitate projections, much narrowed at base, slightly or not constricted at septum; wall dark chestnut-brown above, fading to golden below, about 1.5 μ thick, thicker above, 7–10 μ, digitate projections 9–12 μ long; pedicel short, fragile, concolorous with the base of spore.

ON POACEAE:
Trisetum Virletii Fourn., Mexico (state), Michoacan.
TYPE LOCALITY: Ixtaccihuatl, Mexico, on *Trisetum Virletii*.
DISTRIBUTION: Southern Mexico.

57. **Dicaeoma Rhamni** (Pers.) Kuntze, Rev. Gen. **3**^{3}: 470. 1898.

Aecidium Rhamni Pers. in J. F. Gmel. Syst. Nat. **2**: 1472. 1791.
Aecidium crassum Pers. Neues Mag. Bot. **1**: 92. 1794.
Aecidium Cathartici Schum. Enum. Pl. Saell. **2**: 225. 1803.
Puccinia coronata Corda, Ic. Fung. **1**: 6. 1837.
Solenodonta graminis Cast. Cat. Pl. Mars. 203. 1845.
Aecidium Allenii G. W. Clinton; Peck, Ann. Rep. N. Y. State Mus. **24**: 93. 1872.
Aecidium pulcherrimum Rav.; Berkeley, Grevillea **3**: 61. 1874.
Puccinia Lolii Nielsen, Ugeskr. Landm. **1875**^{1}: 549. 1875.
Puccinia Rhamni Wettst. Verh. Zool.-Bot. Ges. Wien **35**: 545. 1886.
Puccinia coronifera Kleb. Zeits. Pflanzenkr. **4**: 135. 1894.
Puccinia Catharticae Lagerh. Tromsö Mus. Aarsh. **17**: 52. 1895.
Puccinia coronata f. *Melicae* Eriksson, Ber. Deuts. Bot. Ges. **12**: 322, hyponym. 1894; Centralbl. Bakt. **3**^{2}: 303. 1897.
Puccinia Melicae Sydow, Monog. Ured. **1**: 760. 1903.
Dicaeoma Melicae Arth. Proc. Ind. Acad. Sci. **1903**: 149. 1904.
Puccinia Beckmanniae McAlpine, Rusts Austr. 116. 1906.
Puccinia praegracilis Arth. Bull. Torrey Club **34**: 585. 1907.
Puccinia Erikssonii Bubák, Arch. Nat. Land. Böhmen **13**: 107. 1908.

O. Pycnia epiphyllous, in small crowded groups, honey-yellow, becoming blackish, globose in vertical section, 60–95 μ in diameter; ostiolar filaments short.

I. Aecia hypophyllous and caulicolous, in crowded circular groups, 5 mm. or more across, on discolored, more or less hypertrophied spots, cylindric, 0.2–0.3 mm. broad, up to 1 mm. high; peridium colorless, the margin recurved and irregularly lacerate; peridial cells oblong, 19–24 by 26–35 μ, the inner wall rather thick, 5–7 μ, coarsely verrucose, the outer wall thicker, 7–12 μ, smooth, transversely striate; aeciospores globoid or broadly ellipsoid, 15–19 by 16–24 μ; wall thin, 1–1.5 μ, colorless, closely and minutely verrucose.

ON RHAMNACEAE:
Berchemia scandens (Hill) Trel. (*B. volubilis* DC.), Alabama, Louisiana, Mississippi, South Carolina.
Rhamnus alnifolia L'Hér., Idaho, Iowa, Michigan, Montana, New York, Vermont, Wisconsin; Manitoba, Ontario.
Rhamnus caroliniana Walt., Indiana.
Rhamnus cathartica L., Iowa, New York, North Dakota, South Dakota, Vermont, Wisconsin.
Rhamnus lanceolata Pursh, Indiana, Iowa, Missouri, Nebraska.
Rhamnus Purshiana DC., Idaho, Montana, Oregon, Washington; British Columbia.
Rhamnus Smithii Greene, Colorado.

ON ELAEAGNACEAE:
Elaeagnus commutata Bernh. (*E. argentea* Pursh), Montana, North Dakota; Alberta.
Lepargyraea argentea (Nutt.) Greene (*Shepherdia argentea* Nutt.), Colorado, Montana, Nebraska, Wyoming.
Lepargyraea canadensis (L.) Greene (*Shepherdia canadensis* Nutt.), Colorado, Idaho, Michigan, Montana, New Mexico, New York, Oregon, South Dakota, Utah, Washington, Wyoming; Alberta, Yukon.

II. Uredinia amphigenous, scattered, often covering the entire leaf, elliptic, 0.5–1 mm. long, soon naked, pulverulent, brownish-yellow, ruptured epidermis apparent; paraphyses variable, usually few or none, cylindric or somewhat clavate, 7–16 by 39–80 μ, the wall uniformly thin, about 1 μ, smooth, pale-yellow or colorless; urediniospores globoid or broadly

ellipsoid, 16–20 by 18–24 μ; wall pale-yellow, thin, 1–1.5 μ, finely and closely echinulate, the pores indistinct, 6–8, scattered.

III. Telia amphigenous, scattered, oblong, 0.5–1.5 mm. in length, long covered by the epidermis, blackish-brown, without stroma or with a very slight one surrounding the sori; teliospores clavate-oblong or cylindric, 13–19 by 30–67 μ, with 3–10 digitate projections in coronate arrangement above, narrowed below, not or slightly constricted at septum; wall chestnut-brown above, paler below, 1–1.5 μ thick, much thickened above, 7–15 μ including projections; pedicel very short, tinted.

This species is composed of several races brought to light by cultures (*cf.* Kleb. Wirtsw. Rostp. 254, 257, 290. 1904; Treboux, Ann. Myc. **12**: 483. 1914), but inseparable on a morphological basis.

ON POACEAE:

Achyrodes aureum (L.) Kuntze (*Lamarckia aurea* Moench), California.
Agropyron repens (L.) Beauv., Vermont.
Agropyron Smithii Rydb. (*A. occidentale* Scribn.), Saskatchewan.
Agrostis alba L. (*A. vulgaris* With.), Oregon.
Agrostis diegoensis Vasey, Oregon.
Agrostis exarata Trin. (*A. microphylla* Steud.), Oregon, Washington; British Columbia.
Agrostis longiligula Hitchc., Oregon.
Agrostis maritima Lam., Oregon.
Agrostis Thurberiana Hitchc., British Columbia.
Alopecurus aristulatus Michx., Indiana.
Avena barbata Brot., California.
Avena fatua L., California, Iowa; Michoacan.
Avena sativa L., Alabama, Arkansas, Colorado, Connecticut, Delaware, District of Columbia, Florida, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, Nebraska, New Jersey, New Mexico, New York, North Carolina, North Dakota, Ohio, Oklahoma, Oregon, Pennsylvania, South Dakota, Tennessee, Texas, Virginia, West Virginia, Wisconsin; Nova Scotia, Ontario; Cuba.
Beckmannia erucaeformis (L.) Host, Colorado, Iowa, South Dakota.
Bromus pendulinus Sessé (*B. laciniatus* Beal), Mexico (state).
Bromus Porteri (Coult.) Nash, Colorado.
Bromus Pumpellianus Scribn., Colorado.
Bromus Richardsonii Link, Colorado.
Calamogrostis canadensis (Michx.) Beauv., Colorado, Idaho, Indiana, Iowa, Michigan, Minnesota, Nebraska, New York, Oregon, Washington, Wisconsin; Manitoba, Nova Scotia, Saskatchewan.
Calamagrostis hyperborea Lange (*C. robusta* Vasey), North Dakota, Oregon.
Calamagrostis koelerioides Vasey, California.
Calamagrostis purpurascens R. Br., Colorado.
Calamagrostis rubescens Buckl., Alberta.
Cinna arundinacea L., Indiana, Iowa, Maryland, Wisconsin.
Cinna latifolia (Trev.) Griseb., Montana.
Deschampsia caespitosa (L.) Beauv. (*Aira caespitosa* L.), Wyoming.
Elymus innovatus Beal (*E. Brownii* Scribn.), South Dakota; Alberta.
Festuca elatior L., Connecticut, Kansas, Maine, Massachusetts, Nebraska, New York, Oregon, Vermont, Virginia.
Festuca subulata Trin., Oregon.
Lolium multiflorum Lam., California, Oregon, Washington.
Lolium perenne L., Arizona, California, Oregon, South Carolina; Mexico (state).
Melica purpurascens (Torr.) Hitchc. (*M. striata* Hitchc., *Avena striata* Michx.), Wisconsin.
Notholcus lanatus (L.) Nash (*Holcus lanatus* L.), California, Mississippi, New York, North Carolina, Oregon, Pennsylvania, Virginia, Washington, West Virginia; British Columbia,
Panicularia elata Nash (*P. nervata elata* Piper, *Glyceria elata* Hitchc.), Oregon.
Panicularia pauciflora (Presl) Kuntze (*Glyceria pauciflora* Presl), Oregon, Washington; western Canada.
Poa compressa L., Kansas, Missouri.
Polypogon monspeliensis (L.) Desf. (*Alopecurus monspeliensis* L.), California.
Scolochloa festucacea (Willd.) Link, North Dakota; Manitoba.
Torresia odorata (L.) Hitchc. (*Savastana odorata* Scribn.), New York.
Trisetum cernuum (Kunth) Trin. (*T. nutkaense* Scribn. & Merr.), Washington.

TYPE LOCALITY: Europe, on *Rhamnus* sp.

DISTRIBUTION: Widely distributed in North America, from Nova Scotia and British Columbia to southern Mexico, and sparingly in the West Indies; also in Europe, Asia, Australia, and northern Africa.

ILLUSTRATIONS: Beitr. Krypt. Schweiz 2^2: *f. 271;* McAlpine, Rusts Austr. *pl. 2, f. 11, 14;* Grove, British Rust Fungi *f. 195;* Bull. Lab. Nat. Hist. Univ. Iowa **4**: *pl. 11, f. 31a–e;* Krypt.-fl. Brand. Pilze **3**: *f. B193, 194;* Corda, Ic. Fung. **1**: *pl, 2, f, 96;* Rostr., Plantep. Haandb. *f. 88, 89.*

EXSICCATI: Arth. & Holway, Ured. Exs. Ic. *31a–e;* Barth. N. Am. Ured. *167, 431, 551, 566, 660, 764, 863, 864, 865, 1073, 1169, 1365, 1468, 1601, 1774, 1801, 1864, 1901, 1964, 1965, 2001, 2056, 2101, 2160, 2161, 2162, 2262;* Barth. Fungi Columb. *3177, 3367, 3464, 3664, 3670, 3749, 3965, 3966, 3968, 3969, 3971, 4161, 4466, 4602, 4671, 4763, 4862, 4863, 4972, 4973, 5069;* Brenckle, Fungi Dak. *126, 340, 340a, 414;*, Clements, Crypt. Form. Colo. *591;* Ellis, N. Am. Fungi *269;* Ellis & Ev.

N. Am. Fungi *1815, 1821, 2712;* Ellis & Ev. Fungi Columb. *486, 1299, 1702, 1974, 2069, 2149;* Garrett, Fungi Utah. *226;* D. Griff. W. Am. Fungi *263, 297, 368;* Kellerm. Ohio Fungi *94;* Rab.-Wint.-Paz. Fungi Eur. *4039;* Rav. Fungi Car. **1**: *92;* Roum. Fungi Sel. *4412;* Sydow, Ured. *1980, 2449.*

58. **Dicaeoma Periclymeni** (Schum.) Arthur & Fromme.

Aecidium Periclymeni Schum. Enum. Pl. Saell. **2**: 225. 1803.
Aecidium Xylostei DC. Fl. Fr. **2**: 240. 1805.
Uredo Festucae DC. Fl. Fr. **6**: 82. 1815.
Caeoma Lonicerae Schlecht. Fl. Berol. **2**: 115. 1824.
Caeoma periclymenatum Link, in Willd. Sp. Pl. **6**^{2}: 52. 1825.
Caeoma xylosteatum Link, in Willd. Sp. Pl. **6**^{2}: 53. 1825.
Aecidium Lonicerae Duby, Bot. Gall. 906. 1830.
Puccinia Festucae Plowr. Gard. Chron. III. **8**: 42, 139. 1890.
Uredo abscondita Fautrey; Fautrey & Lambotte, Rev. Myc. **17**: 171. 1895.
Dicaeoma Festucae Kuntze, Rev. Gen. **3**^{3}: 468. 1898.

O. Pycnia amphigenous, gregarious in small groups 3–4 mm. across, inconspicuous, honey-yellow, flattened-globoid, 64–98 μ broad by 32–64 μ high; ostiolar filaments up to 90 μ, agglutinate into a column.

I. Aecia hypophyllous, crowded on yellowish spots 3–5 mm. across, cupulate, 0.2–0.3 mm. in diameter; peridium colorless, the margin recurved and slightly lacerate; peridial cells rhombic, 19–29 by 29–39 μ, abutted, the outer wall 5–10 μ thick, transversely striate, smooth, the inner wall thinner, 3–7 μ, very closely verrucose; aeciospores ellipsoid, globoid or oblong, 17–23 by 19–29 μ; wall colorless, 1–1.5 μ, very finely and closely verrucose.

ON CAPRIFOLIACEAE:
Lonicera coerulea L., New Brunswick.
Lonicera flava Sims, Iowa.

II. Uredinia hypophyllous, scattered, linear, 0.5–2 mm. long, early naked, pulverulent, yellow, ruptured epidermis conspicuous; urediniospores broadly ellipsoid, 19–23 by 20–26 μ; wall pale-yellow, 1–1.5 μ thick, moderately and rather conspicuously echinulate, the pores distinct, 5–7, scattered.

III. Telia hypophyllous, scattered, linear, 0.5–2 mm. long, rather early naked by a longitudinal splitting of the epidermis, chestnut- or chocolate-brown, ruptured epidermis conspicuous; teliospores oblong or cylindric, 13–19 by 45–58 μ, provided above with 2–5 erect prongs, 10–25 μ long, somewhat narrowed below, slightly constricted at septum; wall chestnut-brown, paler below, 1 μ, thicker above, 3–7 μ, smooth; pedicel pale chestnut-brown, up to 20 μ long.

ON POACEAE:
Festuca ovina L., *F. rubra* L., and similar species in Europe: not yet found in North America.
TYPE LOCALITY: Island of Zealand, Denmark, on *Lonicera Periclymenum.*
DISTRIBUTION: The island of Grand Manan, New Brunswick, and a single locality in northern Iowa; also in Europe.
ILLUSTRATIONS: Beitr. Krypt. Schweiz **2**^{2}: *f. 27*^{2}: Krypt.-fl. Brand. Pilze **3**: *f. B195.*
EXSICCATI: Ellis, N. Am. Fungi *1020.*

59. **Dicaeoma Cynodontis** (Lacroix) Kuntze, Rev. Gen. **3**^{3}: 468. 1898.

Aecidium Plantaginis Ces. Erb. Critt. Ital. *247.* 1859. Not *Dicaeoma Plantaginis* Kuntze. 1898.
Puccinia Cynodontis Lacroix, in Desmaz. Pl. Crypt. II. *655.* 1859.

O. Pycnia epiphyllous, in small groups on discolored spots, honey-yellow, becoming blackish, flattened-globoid, 110–160 μ broad by 60–90 μ deep; ostiolar filaments short.

I. Aecia amphigenous, in circular groups 1–3 mm. in diameter, on discolored spots, short-cupulate, small, 0.2–0.3 mm. broad; peridium yellowish or colorless, the margin lacerate and slightly recurved; peridial cells angularly oblong, 15–21 by 26–34 μ, abutted, the outer wall smooth, transversely striate, 7–9 μ thick, the inner wall coarsely verrucose, thinner, 3–5 μ; aeciospores globoid or ellipsoid, 19–24 by 23–29 μ; wall colorless, 1.5–2 μ thick, closely and conspicuously verrucose.

ON PLANTAGINACEAE:
Plantago spp., in Europe and Japan, not yet found in America.

II. Uredinia chiefly hypophyllous, scattered or in small groups, elliptic or oblong, small, 0.3–0.6 mm. long, early naked, pulverulent, cinnamon-brown, ruptured epidermis conspicuous;

urediniospores globoid, 19–23 by 20–26 μ; wall cinnamon-brown, 1.5–3 μ thick, very finely and inconspicuously verrucose, appearing smooth when wet, the pores 2, occasionally 3, equatorial.

III. Telia chiefly hypophyllous, scattered or sometimes forming lines, oblong or linear, 0.5–1 mm. long, early naked, blackish-brown, ruptured epidermis rather inconspicuous; teliospores ellipsoid or oblong, 16–22 by 28–42 μ, rounded or attenuate above, obtuse or slightly narrowed below, slightly constricted at septum; wall dark chestnut-brown above, paler below and in the attenuate apex, 1.5–2.5 μ thick, much thicker above, 6–12 μ, smooth; pedicel slightly tinted or colorless, one and a half times length of spore or less.

ON POACEAE:

Capriola dactylon (L.) Kuntze (*Cynodon dactylon* Pers.), Arizona, California, Florida, Texas; Guatemala; Panama; Porto Rico.

TYPE LOCALITY: St. Romain-sur-Vienne, France, on *Cynodon Dactylon*.

DISTRIBUTION: Florida to southern California, and southward through the West Indies, and Central America; also in the warmer parts of Europe, Asia, Africa, and Japan.

EXSICCATI: Barth. N. Am. Ured. *1646, 2143*.

60. **Dicaeoma Fraxini** (Schw.) Arth. Résult. Sci. Congr. Bot. Vienne 344. 1906.

Aecidium Fraxini Muhl. Cat. 107; hyponym. 1813.
Aecidium Fraxini Schw. Schr. Nat. Ges. Leipzig **1**: 66. 1822.
Caeoma fraxinatum Link, in Willd. Sp. Pl. **6**^{2}: 62. 1825.
Caeoma (*Roestelia*) *Fraxinites* Schw. Trans. Am. Phil. Soc. II. **4**: 294. 1832.
Uredo peridermiospora Ellis & Tracy, Jour. Myc. **6**: 77. 1890.
Puccinia sparganioides Ellis & Barth. Erythea **4**: 2. 1896.
Puccinia peridermiospora Arth. Science II. **10**: 565. 1899.
Puccinia fraxinata Arth. Bot. Gaz. **34**: 6. 1902. Not *P. Fraxini* Kom. 1898.

O. Pycnia epiphyllous, in crowded groups 2–3 mm. in diameter, on circular discolored areas, honey-yellow, becoming brownish, globose in vertical section, 100–135 μ broad; ostiolar filaments 50–75 μ long.

I. Aecia chiefly hypophyllous, sometimes petiolicolous and fructicolous, in crowded circular groups 3–8 mm. in diameter, cylindric, 0.3–0.5 mm. broad by 0.6–1 mm. high; peridium yellowish, margin entire or irregularly lacerate, only slightly recurved; peridial cells oblong or cylindric, 21–29 by 35–58 μ, strongly imbricate, the outer wall thick, 7–13 μ, smooth, striate, the inner wall thinner, 3–7 μ, conspicuously verrucose; aeciospores globoid, ellipsoid, or ovoid, 21–27 by 26–35 μ; wall colorless, 2–3 μ thick, much thicker above, 7–13 μ, very finely and closely verrucose.

ON OLEACEAE:

Forestiera phillyreoides Torr., Nuevo León.
Forestiera porulosa (Michx.) Poir. (*Adelia porulosa* Michx.), Florida.
Fraxinus americana L., Colorado, District of Columbia, Iowa, Massachusetts, Missouri, New York, Pennsylvania, Wisconsin.
Fraxinus campestris Britton, Montana, Nebraska.
Fraxinus caroliniana Mill., Florida.
Fraxinus nigra Marsh. (*F. sambucifolia* Lam.), Massachusetts, Wisconsin.
Fraxinus pennsylvanica Marsh (*F. pubescens* Lam., *F. lanceolata* Borkh., *F. viridis* Michx.), Delaware, Iowa, Kansas, Louisiana, Maryland, Massachusetts, Minnesota, Missouri, Nebraska, New York, North Dakota, Pennsylvania, South Dakota, Vermont.
Fraxinus profunda Bush, Indiana.
Fraxinus quadrangulata Michx., Illinois.

II. Uredinia hypophyllous, on the smooth surface, supercostal, arising from the hard tissues, crowded and often confluent, ellipsoid or oblong-linear, 0.5–2 mm. long, becoming naked by a longitudinal slit, ruptured epidermis conspicuous, pulverulent, pale-yellowish; urediniospores obovoid or ellipsoid, 18–29 by 27–48 μ; wall colorless, 1.5–3 μ thick, much thicker above, 7–10 μ, rather sparsely and prominently verrucose-echinulate, the pores inconspicuous, 4, equatorial.

III. Telia chiefly hypophyllous, crowded and often confluent, elongate on sheaths and culms, oblong-linear, 1–3 mm. long, prominent, early naked, compact, pulvinate, blackish-brown, ruptured epidermis attached in shreds or disappearing; teliospores oblong or ellipsoid, 16–24 by 35–62 μ, rounded at both ends or obtuse above, slightly constricted at septum; wall chocolate-brown, about 1.5 μ thick, thicker at apex, 5–7 μ, smooth; pedicel pale-yellow or golden, persistent, once to twice length of spore.

ON POACEAE:
Spartina alterniflora glabra (Muhl.) Fernald (*S. glabra* Muhl., *S. glabra alterniflora* Merr.), Delaware, Florida, Mississippi, New Hampshire.
Spartina cynosuroides (L.) Roth (*S. polystachya* Ell.), Delaware, Florida, Louisiana, Maryland, South Carolina.
Spartina gracilis Trin., Kansas, Nebraska, Oklahoma, South Dakota.
Spartina Michauxiana Hitchc. (*S. cynosuroides* A. Gray, not Roth), Arkansas, Illinois, Indiana, Iowa, Kansas, Maine, Maryland, Missouri, Nebraska, North Dakota, Ohio, Oklahoma, South Dakota, Vermont, Wisconsin.
Spartina patens (Ait.) Muhl. (*S. juncea* Ell.), Connecticut, New Jersey, New York.

TYPE LOCALITY: North Carolina, on [*Fraxinus* sp.].

DISTRIBUTION: East of the Rocky Mountains from Montana to Oklahoma and the Atlantic coast.

ILLUSTRATIONS: Bot. Gaz. **34**: *9, f. 2f, g, h;* Bull. Lab. Nat. Hist. Univ. Iowa **5**: *pl. 5, 6, f. 54a–k.*

EXSICCATI: Arth. & Holway, Ured. Exs. Ic. *54a–k;* Barth. Fungi Columb. *2663, 3254, 3354, 3935, 4261;* Barth. N. Am. Ured. *237, 437, 543, 738, 739, 1149, 1754;* Brenckle, Fungi Dak. *2, 15;* Carleton, Ured. Am. *33;* Clements, Crypt. Form. Colo. *560;* Ellis & Ev. N. Am. Fungi *1851, 3475;* Ellis & Ev. Fungi Columb. *499a, b, 1072, 1288, 1576, 1645, 1852, 2055;* D. Griff. W. Am. Fungi *14* in part; Kellerm. Ohio Fungi *193;* Rav. Fungi Car. **4**: *89;* Roum. Fungi Gall. *4040;* Seym. & Earle, Econ. Fungi *209;* Sydow, Ured. *262, 1167, 1881, 1982, 2273, 2423.*

61. **Dicaeoma Distichlidis** (Ellis & Ev.) Kuntze, Rev. Gen. **3**[3]: 468. 1898.

Puccinia Distichlidis Ellis & Ev. Proc. Acad. Phila. **1893**: 152. 1893.
Puccinia Kelseyi Sydow, Monog. Ured. **1**: 806. 1904.

O. Pycnia chiefly epiphyllous, gregarious, in small groups 0.5–1.5 mm. across, not conspicuous, punctiform, honey-yellow, becoming brownish, globoid, 80–160 μ in diameter by 70–150 μ high; ostiolar filaments 30–50 μ long.

I. Aecia chiefly hypophyllous, gregarious, more or less crowded in groups 1–4 mm. across, on slightly discolored spots, cupulate, slightly bullate, short, 0.2–0.4 mm. in diameter; peridium colorless, the margin irregularly lacerate, slightly recurved; peridial cells rhomboidal, 21–29 μ long, the outer wall transversely striate, 4–7 μ thick, smooth, the inner wall rather finely verrucose, 2–4 μ thick; aeciospores globoid, 15–24 by 18–27 μ; wall colorless, 1.5–2 μ, evenly and finely verrucose.

ON PRIMULACEAE:
Glaux maritima L., Montana, Wyoming; Saskatchewan.
Steironema ciliatum (L.) Raf. (*Lysimachia ciliata* L.), Colorado, North Dakota; Manitoba.

II. Uredinia epiphyllous, on the rough surface, intercostal, arising from the mesophyll, numerous, oval, 0.3–0.5 mm. long, early naked, yellowish, ruptured epidermis conspicuous; urediniospores globoid or broadly ellipsoid, 23–28 by 26–35 μ; wall pale-yellow, uniformly thick, 3–4 μ, moderately and strongly echinulate, the pores 6–8, scattered, rather indistinct.

III. Telia epiphyllous, sometimes caulicolous, intercostal, numerous, crowded, often confluent, oblong or linear, 0.5–2 mm. long, early naked, blackish-brown, ruptured epidermis conspicuous; teliospores obovoid or lance-oblong, 21–27 by 42–64 μ, obtuse or acute above, somewhat narrowed below, slightly constricted at septum; wall dark chestnut-brown, moderately thin, 1.5–2 μ, strongly thickened above, 7–13 μ; pedicel golden-brown, rather thick, as long as spore or longer.

This species is morphologically indistinguishable from *Nigredo Polemonii* (Peck) Arth., except in the possession of two-celled teliospores. The two forms are maintained separately for convenience but should be united eventually under one name.

ON POACEAE:
Spartina cynosuroides (L.) Roth (*S. polystachya* Ell.), Florida.
Spartina gracilis Trin., Montana, Nebraska, South Dakota, Wyoming.
Spartina Michauxiana Hitchc. (*S. cynosuroides* A. Gray, not Roth), Colorado, Iowa, Montana, Nebraska, New York, North Dakota, South Dakota; Manitoba.
Spartina pectinata Bosc, Saskatchewan.

TYPE LOCALITY: Helena, Montana, on "*Distichlis maritima,*" error for *Spartina gracilis.*

DISTRIBUTION: Plains from Montana and Manitoba southward to Nebraska, as well as in western New York and in eastern Florida.

ILLUSTRATIONS: Bot. Gaz. **34**: *13, f. 3m, n;* Bull. Lab. Nat. Hist. Univ. Iowa **5**: *pl. 7, f. 55a.*

EXSICCATI: Arth. & Holway, Ured. Exs. Ic. *55a;* Barth. Fungi Columb. *2388, 3551, 4754;* Barth. N. Am. Ured. *432, 737, 1039, 1040, 1041, 1647;* Brenckle, Fungi Dak. *108, 316;* D. Griff. W. Am. Fungi *14* in part, *14a, 358* in part.

62. **Dicaeoma Cephalanthi** (Seym.) H. S. Jackson, Proc. Ind. Acad. Sci. **1915**: 444. 1916.

Aecidium Cephalanthi Seym.; Burrill, Bot. Gaz. **9**: 191. 1884.
Puccinia Seymouriana Arth. Bot. Gaz. **34**: 11. 1902.
Aecidium obesum Arth. Bull. Torrey Club **37**: 579. 1910.

O. Pycnia amphigenous, in small crowded, opposed groups 0.3–1 mm. across, inconspicuous, honey-yellow becoming brownish, flattened-globoid, small, 96–128 μ broad by 58–77 μ high; ostiolar filaments 30–48 μ long.

I. Aecia hypophyllous, in circular groups 2–7 mm. across, irregularly crowded on scarcely thickened but much discolored spots, cupulate, 0.3–0.5 mm. in diameter; peridium colorless, evanescent; peridial cells oblong to cylindric, often slightly curved, 16–23 by 32–64 μ, overlapping, the outer wall thick, 5–9 μ, smooth, transversely striate, the inner wall moderately thick, 3–6 μ, coarsely verrucose; aeciospores globoid or broadly ellipsoid, large, 29–35 by 32–42 μ; wall colorless, greatly thickened, 5–12 μ, irregular within, forming an angular or stellate cavity, closely and prominently verrucose.

ON APOCYNACEAE:
Amsonia Amsonia (L.) Britton (*A. Tabernaemontana* Walt., *A. salicifolia* Pursh), Missouri.
Apocynum cannabinum L., Indiana, New Jersey, Oklahoma.
Apocynum sibiricum Jacq. (*A. hypericifolium* Ait., *A. cannabinum hypericifolium* A. Gray), Illinois, Kansas, Nebraska.

ON ASCLEPIADACEAE:
Asclepias pulchra Ehrh., New York.
Asclepias syriaca L. (*A. Cornuti* Decaisne), Missouri.
Asclepias sp., North Dakota.

ON RUBIACEAE:
Cephalanthus occidentalis L., Florida, Illinois, Indiana, Kansas, Missouri, Nebraska, New Jersey, New York; Quebec.

II. Uredinia epiphyllous, on the rough surface, intercostal, arising from the soft tissues, scattered, narrowly oblong or oblong-linear, 0.5–1 mm. long, early naked, orange-yellow becoming brownish, pulverulent, ruptured epidermis inconspicuous; urediniospores obovoid or broadly ellipsoid, large, 19–35 by 29–45 μ; wall colorless, 2–3 μ thick at the sides, greatly thickened above, 9–18 μ, sparsely and very prominently verrucose-echinulate, the pores obscure.

III. Telia epiphyllous, numerous, crowded and sometimes confluent, oblong, 0.5 mm. broad by 1–5 mm. long, early naked, pulvinate, compact, chocolate-brown, ruptured epidermis soon disappearing; teliospores oblong or cylindric, 16–23 by 37–58 μ, rounded, obtuse or acute above, narrowed at base, only slightly constricted at septum; wall smooth, chestnut- or dark chestnut-brown, about 1.5 μ thick, moderately thickened at apex, 5–9 μ; pedicel colorless, once to twice length of spore.

ON POACEAE:
Spartina cynosuroides (L.) Roth (*S. polystachya* Ell.), New York.
Spartina Michauxiana Hitchc. (*S. cynosuroides* A. Gray, not Roth), Illinois, Indiana, Iowa, Kansas, Massachusetts, Montana, Nebraska, North Dakota, Oklahoma, Wisconsin; Ontario, Quebec.
Spartina Spartinae (Trin.) Merr. (*S. junciformis* Engelm. & Gray), Texas.

TYPE LOCALITY: Ravenswood, near Chicago, Illinois, on *Cephalanthus occidentalis*.

DISTRIBUTION: Prairies from Montana to Wisconsin, and southward to Texas, from central St. Lawrence-river region southward to central New York, and on the Atlantic coast from Massachusetts to Florida.

ILLUSTRATIONS: Bot. Gaz. **34**: *13, f. 3k, l;* Bull. Lab. Nat. Hist. Univ. Iowa **5**: *pl. 4, 5, f. 53a, b.*

EXSICCATI: Arth. & Holway, Ured. Exs. Ic. *53a, b;* Barth. Fungi Columb *3265, 3369, 3967, 4103;* Barth. N. Am. Ured. *261, 766, 966, 1171, 1301;* Brenckle, Fungi Dak. *445;* Carleton, Ured. Am. *20;* Ellis, N. Am. Fungi *1474;* Ellis & Ev. Fungi Columb. *1295;* Ellis & Ev. N. Am. Fungi *1817, 2225* in part; Rab.-Wint. Fungi Eur. *3518;* Rab.-Wint.-Paz. Fungi Eur. *4026;* Roum. Fungi Gall. *3864;* Seym. & Earle, Econ. Fungi *69;* Sydow, Ured. *496;* Vesterg. Micr. Rar. Sel. *1101, 1102.*

63. **Dicaeoma Chloridis** (Speg.) Kuntze, Rev. Gen. 3^3: 468. 1898.

Puccinia Chloridis Speg. Rev. Arg. Hist. Nat. **1**: 115. 1891.
Puccinia Chloridis Dietel, Hedwigia **31**: 290. 1892.
Puccinia Dietelii Sacc. & Sydow; Sacc. Syll. Fung. **14**: 358. 1899.

O and I. Pycnia and aecia unknown.

II. Uredinia amphigenous, scattered, narrowly oblong, small, 0.3–0.7 mm. long, rather tardily naked, pale-yellow or brownish, ruptured epidermis not conspicuous; urediniospores

ellipsoid or obovoid, 18–21 by 23–26 μ; wall golden-yellow, moderately and finely verrucose-echinulate, 1.5–2 μ thick, often much thicker above, 3–7 μ, the pores about 6, scattered and indistinct.

III. Telia amphigenous, scattered, rounded or elliptic, small, 0.3–0.5 mm. long, early naked, pulverulent, dark chocolate-brown, pulvinate, ruptured epidermis not conspicuous; teliospores oblong, 18–26 by 27–42 μ, rounded or obtuse above, rounded or rarely somewhat attenuate below, slightly or not constricted at septum; wall dark chestnut-brown, 2–2.5 μ thick, only slightly thickened above, 5–7 μ; pedicel golden, more deeply colored next to spore, once or twice length of spore, often attached obliquely.

ON POACEAE:
Chloris verticillata Nutt., Kansas, New Mexico, Oklahoma, Texas.
Chloris virgata Sw. (*C. elegans* H.B.K.), Guanajuato, Jalisco, San Louis Potosí.
TYPE LOCALITY: Paraguay, on *Chloris* sp.
DISTRIBUTION: Kansas to central Mexico; also in South America.
ILLUSTRATIONS: Bull. Lab. Nat. Hist. Univ. Iowa **5**: *pl. 7, f. 56a, b.*
EXSICCATI: Arth. & Holway, Ured. Exs. Ic. *56a, b;* Barth. Fungi Columb. *2657, 2658;* Barth. N. Am. Ured. *129;* Sydow, Ured. *2018.*

64. **Dicaeoma exasperans** (Holway) Arthur & Fromme.

Puccinia exasperans Holway, Ann. Myc. **3**: 21. 1905.

O and I. Pycnia and aecia unknown.

II. Uredinia amphigenous, few, scattered, elliptic or oblong, small, 0.3–0.5 mm. long, early naked, pulverulent, cinnamon-brown, ruptured epidermis inconspicuous; urediniospores globoid, broadly ellipsoid or obovoid, 18–25 by 21–29 μ; wall cinnamon-brown, 1–1.5 μ thick, closely and strongly echinulate, the pores about 8, scattered.

III. Telia amphigenous, scattered and evenly distributed, seldom if ever confluent, elliptic or oblong, 0.3–0.5 mm. long, early naked, blackish-brown, pulvinate, ruptured epidermis not apparent; teliospores ellipsoid or oblong, seldom globoid, 16–24 by 25–29 μ, rounded at both ends, or occasionally obtuse above, only slightly or not at all constricted at septum; wall dark chestnut-brown, 1.5–2.5 μ thick, only slightly thicker above, 3–6 μ; pedicel pale-yellow or colorless, twice or thrice length of spore, sometimes attached laterally or at an angle.

ON POACEAE:
Bouteloua curtipendula (Michx.) Torr. (*B. racemosa* Lag., *Atheropogon curtipendulus* Fourn.), Texas; Morelos.
Bouteloua Pringlei Scribn., Guerrero.
TYPE LOCALITY: Cuernavaca, Mexico, on *Bouteloua curtipendula.*
DISTRIBUTION: Northern Texas to southern Mexico.
EXSICCATI: Barth. Fungi Columb. *2654.*

65. **Dicaeoma Boutelouae** (Jennings) Arthur & Fromme.

Diorchidium Boutelouae Jennings, Bull. Texas Exp. Sta. **9**: 25. 1890.
Puccinia Boutelouae Holway, Ann. Myc. **3**: 20. 1905.

O and I. Pycnia and aecia unknown.

II. Uredinia not seen; urediniospores intermixed with the teliospores, globoid, oblong or obovoid, 16–23 by 19–23 μ; wall pale-yellow or colorless, 1.5–2 μ thick, closely and sometimes strongly echinulate, the pores several, obscure, evidently scattered; amphispores sometimes abundant, ellipsoid or globoid, 24–26 by 27–32 μ, the wall chestnut-brown, 2.5–3 μ thick, moderately and strongly echinulate, the pores 6–8, scattered, the pedicel pale-golden or colorless, once or twice length of spore.

III. Telia mostly epiphyllous, scattered and distinct, seldom confluent, elliptic or oblong, small, 0.3–0.7 mm. long, early naked, compact, blackish-brown, pulvinate, ruptured epidermis not apparent; teliospores globoid or broadly ellipsoid, 21–24 by 27–32 μ, rounded at both ends, not constricted at septum, the septum usually oblique or vertical; wall dark chestnut-brown, 2.5–3 μ thick, 5–7 μ above; pedicel pale-yellow or golden, twice or thrice length of spore, usually attached laterally or at an angle.

ON POACEAE:
Bouteloua curtipendula (Michx.) Torr. (*B. racemosa* Lag., *Atheropogon curtipendulus* Fourn.), Texas; Guerrero.
TYPE LOCALITY: College Station, Texas, on *Bouteloua racemosa.*
DISTRIBUTION: Eastern Texas to southern Mexico.

66. **Dicaeoma vexans** (Farl.) Kuntze, Rev. Gen. 3[3]: 471. 1898.

Uromyces Brandegei Peck, Bot. Gaz. **4**: 127. 1879. Not *Dicaeoma Brandegei* Kuntze, 1898.
Puccinia vexans Farl. Proc. Am. Acad. **18**: 82. 1883.

O and I. Pycnia and aecia unknown.

II. Uredinia amphigenous, oval or oblong, scattered, cinnamon-brown, pulverulent, ruptured epidermis inconspicuous; urediniospores globoid or ellipsoid, 24–29 by 26–34 μ; wall yellow or light cinnamon-brown, uniformly thick, 2–3 μ, moderately and finely echinulate, the pores 8, scattered; amphispores numerous, globoid or broadly ellipsoid, 26–35 by 34–42 μ, the wall thick, 3–4 μ, greatly thickened above, up to 12 μ, dark chestnut-brown, moderately and closely verrucose, the pores 3 or 4, equatorial, the pedicel long, up to 100 μ, colorless, mostly persistent.

III. Telia amphigenous, scattered, numerous, ovate or oblong, 0.5–1.5 mm. long, early naked, pulvinate, dark chocolate-brown, ruptured epidermis inconspicuous; teliospores broadly ellipsoid, 23–29 by 32–40 μ, rounded at both ends, or somewhat narrowed below, slightly or not constricted at septum; wall dark chestnut-brown, 2.5–3 μ thick, 6–8 μ thick above; pedicel colorless, as long as spore.

ON POACEAE:
Bouteloua aristidoides (H.B.K.) Griseb., Chihuahua.
Bouteloua curtipendula (Michx.) Torr. (*B. racemosa* Lag., *Atheropogon curtipendulus* Fourn.), Arizona, Colorado, Indiana, Iowa, Kansas, Mississippi, Nebraska, New Mexico, North Dakota, Oklahoma, South Dakota, Texas; Hidalgo, Zacatecas.
Bouteloua ramosa Scribn., Chihuahua.

TYPE LOCALITY: Colorado, on *Bouteloua curtipendula*.

DISTRIBUTION: North Dakota southward to central Mexico, and from the foothills of the Rocky mountains eastward to central Indiana.

ILLUSTRATIONS: Bull. Lab. Nat. Hist. Univ. Iowa **5**: *pl. 8, f. 58a–e;* Bull. Torrey Club **32**: *37, f. 1;* Freeman, Minn. Pl. Diseases 165, *f. 77;* Jour. Appl. Micr. 5: 1656, *f. 3.*

EXSICCATI: Arth. & Holway, Ured. Exs. Ic. *58a–e;* Barth. Fungi Columb. *3575, 4167;* Barth. N. Am. Ured. *72, 579, 773;* Brenckle, Fungi Dak. *17;* Ellis, N. Am. Fungi *1051;* Ellis & Ev. Fungi Columb. *487, 1183, 1283;* Ellis & Ev. N. Am. Fungi *3573;* D. Griff. W. Am. Fungi *85, 253;* Seym. & Earle, Econ. Fungi *532a, b;* Sydow, Ured. *1086, 2280, 2436.*

67. **Dicaeoma Jamesianum** (Peck) Arth. Résult. Sci. Congr. Bot. Vienne 344. 1906.

Aecidium Brandegei Peck, Bot. Gaz. **3**: 34. 1878. Not *Dicaeoma Brandegei* Kuntze, 1898.
Aecidium Jamesianum Peck, Bot. Gaz. **5**: 34. 1880.
Puccinia Bartholomaei Dietel, Hedwigia **31**: 290. 1892.
Dicaeoma Bartholomaei Kuntze, Rev. Gen. 3[3]: 468. 1898.
Puccinia Jamesiana Arth. Bot. Gaz. **35**: 18. 1903.
Puccinia Diplachnis Arth. Bull. Torrey Club **31**: 4. 1904.
Dicaeoma Diplachnis Arth. Résult. Sci. Congr. Bot. Vienne 344. 1906.

O. Pycnia amphigenous, in circular groups, or distributed over large areas, honey-yellow, becoming brownish, immersed, flattened-globoid, 112–160 μ broad by 95–128 μ high; ostiolar filaments 20–35 μ long.

I. Aecia amphigenous and caulicolous, in circular groups 2–5 mm. in diameter, on discolored spots, sometimes so abundant as to appear to be distributed over large areas, cupulate or cylindric, 0.2–0.3 mm. in diameter, sometimes up to 1 mm. in length, usually much shorter; peridium colorless, the margin finely and evenly erose and somewhat recurved; peridial cells rhomboidal or lenticular, 18–26 by 30–45 μ, the outer wall smooth, 7–10 μ thick, transversely striate, the inner wall coarsely verrucose, 3–7 μ thick; aeciospores globoid or ellipsoid, 16–23 by 18–26 μ; wall colorless, 2–3 μ thick, much thickened above, 7–10 μ, closely and finely verrucose.

ON ASCLEPIADACEAE:
Acerates floridana (Lam.) Hitchc. (*A. longifolia* Ell., *Asclepias floridana* Lam.), South Dakota, Wisconsin.
Acerates viridiflora Ell. (*Asclepias viridiflora* Raf.), Kansas, Nebraska.
Asclepias arenaria Torr., Nebraska, Texas.
Asclepias brachystephana Engelm., Arizona, New Mexico.
Asclepias galioides H.B.K., New Mexico.
Asclepias latifolia (Torr.) Raf. (*A. Jamesii* Torr.), New Mexico.
Asclepias macroura A. Gray, Jalisco.
Asclepias ovalifolia Decaisne, North Dakota.
Asclepias pumila (A. Gray) Vail (*A. verticillata pumila* A. Gray), Arizona, Kansas, Nebraska, South Dakota, Texas.

Asclepias speciosa Torr. (*A. Douglasii* Hook.), Kansas, Nebraska, South Dakota.
Asclepias syriaca L. (*A. Cornuti* Decaisne), Illinois, Indiana, Iowa, Missouri, Nebraska, Wisconsin.
Asclepias tuberosa L., Iowa, Kansas, Oklahoma.
Asclepias verticillata L., Colorado, Nebraska.
Asclepiodora decumbens (Nutt.) A. Gray, Oklahoma, Texas.
Asclepiodora viridis (Walt.) A. Gray (*Asclepias viridis* Walt.), Kansas, Oklahoma.
Philibertella Hartwegii Vail (*Philibertia linearis* A. Gray), Chihuahua.
Philibertella Hartwegii heterophylla (Engelm.) Vail, Arizona.

II. Uredinia chiefly epiphyllous, few, elliptic, 0.5–1 mm. long, early naked, pale cinnamon-brown, pulverulent, ruptured epidermis not evident; urediniospores globoid or broadly ellipsoid, 16–23 by 18–26 μ; wall pale-yellow or colorless, 1.5–2 μ thick, finely and closely verrucose-echinulate, the pores obscure, probably 4–8, scattered.

III. Telia chiefly epiphyllous, numerous, crowded, elliptic, 0.5–1 mm. long, early naked, pulvinate, dark chocolate-brown, ruptured epidermis not apparent; teliospores broadly ellipsoid or oblong, 19–24 by 29–42 μ, usually rounded at both ends, or sometimes obtuse above and narrowed below, slightly constricted at septum; wall chestnut-brown, 1.5–2 μ thick, moderately thickened above, 5–9 μ, smooth; pedicel golden-brown, once or twice length of spore or sometimes more, occasionally attached at an angle.

ON POACEAE:
Bouteloua barbata Lag. (*B. microstachya* Dewey), Texas.
Bouteloua curtipendula (Michx.) Torr. (*B. racemosa* Lag., *Atheropogon curtipendulus* Fourn.), Arizona, Iowa, Kansas, New Mexico, Oklahoma, Texas.
Bouteloua filiformis (Fourn.) D. Griff. (*Atheropogon filiformis* Fourn.), Guatemala.
Bouteloua gracilis (H.B.K.) Lag. (*B. oligostachya* Torr.), Arizona, Colorado, Kansas, Montana, Nebraska, North Dakota, South Dakota, Texas.
Bouteloua hirsuta Lag., Nebraska.
Leptochloa dubia (H.B.K.) Nees (*Diplachne dubia* Benth.), Texas; Hidalgo.
TYPE LOCALITY: Colorado, on *Asclepias verticillata*.
DISTRIBUTION: Wisconsin to Montana southward to Texas and Arizona, and sparingly through Mexico and Central America.
ILLUSTRATIONS: Bull. Lab. Nat. Hist. Univ. Iowa 5: *pl. 9, f. 59a–e.*
EXSICCATI: Arth. & Holway, Ured. Exs. Ic. *59a–e;* Barth. Fungi Columb. *2766, 4140, 4953;* Barth. N. Am. Ured. *420, 620, 821, 928, 1028, 1531;* Brenckle, Fungi Dak. *183;* Carleton, Ured. Am. *32;* Clements, Crypt. Form. Colo. *548;* Ellis, N. Am. Fungi *1012;* Ellis & Ev. Fungi Columb. *556, 865, 1569, 1603, 1965, 2061, 2062;* Ellis & Ev. N. Am. Fungi *2225* in part, *2990, 3349;* D. Griff. W. Am. Fungi *269;* Sydow, Ured. *1061, 2112.*

68. **Dicaeoma Leptochloae** Arthur & Fromme.

Puccinia Leptochloae Arth. & Fromme, Torreya 15: 263. 1915.

O and I. Pycnia and aecia unknown.

II. Uredinia amphigenous, oval, oblong, or linear, early naked, pulverulent, ruptured epidermis inconspicuous; urediniospores globoid, 21–24 by 23–26 μ; wall light cinnamon-brown, moderately thick, 2–2.5 μ, minutely and closely verrucose, the pores usually 4, sometimes 6, scattered.

III. Telia amphigenous, crowded, oval, oblong or linear, 0.5–2 mm. long, early naked, pulverulent, pulvinate, blackish-brown, ruptured epidermis inconspicuous; teliospores oblong or broadly ellipsoid, 21–27 by 26–35 μ, both ends rounded, scarcely constricted at septum; wall dark chestnut-brown, about 2 μ thick, 3–7 μ above; pedicel golden, as long as spore.

ON POACEAE:
Leptochloa filiformis (Lam.) Beauv. (*L. mucronata pulchella* Scribn.) Texas; Sonora; Porto Rico.
TYPE LOCALITY: Guaymas, Mexico.
DISTRIBUTION: Southern Texas westward to the Gulf of California, and in Porto Rico; also in South America.

69. **Dicaeoma kansense** (Ellis & Barth.) Arth. Résult. Sci. Congr. Bot. Vienne 344. 1906.

Puccinia kansensis Ellis & Barth. Erythea 4: 1. 1896.

O and I. Pycnia and aecia unknown.

II. Uredinia mostly epiphyllous, few, scattered, linear or sub-linear, very small, 0.2–0.3 mm. long, early naked, mostly superficial, ruptured epidermis conspicuous; urediniospores globoid or broadly ellipsoid, small, 14–18 by 19–21 μ; wall colorless, 1.5–2 μ thick, finely and closely echinulate, the pores rather indistinct, at least 6, scattered.

III. Telia oblong or linear, scattered, sometimes confluent, small, 0.3–0.5 mm. long, early naked, mostly superficial, chocolate-brown, ruptured epidermis conspicuous; teliospores oblong or elliptic, 16–20 by 23–30 μ, both ends rounded, slightly constricted at septum; wall dark chestnut-brown, 1.5–2 μ thick, scarcely or not at all thickened at apex; pedicel nearly colorless, fragile, rarely as long as spore.

ON POACEAE:
Bulbilis dactyloides (Nutt.) Raf. (*Buchloë dactyloides* Engelm.), Kansas, Nebraska.
TYPE LOCALITY: Rooks county, Kansas, on *Buchloë dactyloides*.
DISTRIBUTION: Central Kansas to central Nebraska.
ILLUSTRATION: Bull. Lab. Nat. Hist. Univ. Iowa **5**: *pl. 9, f. 60a*.
EXSICCATI: Arth. & Holway, Ured. Exs. Ic. *60a;* Barth. Fungi Columb. *2664, 3358;* Barth. N. Am. Ured. *151;* Ellis & Ev. Fungi Columb. *869;* Ellis & Ev., N. Am. Fungi *3351;* Seym. & Earle, Econ. Fungi Suppl. *B13;* Sydow, Ured. *1073*.

70. **Dicaeoma rubellum** (Pers.) Arthur & Fromme.

Aecidium rubellum Pers. in J. F. Gmel. Syst. Nat. **2**: 1473. 1791.
Aecidium Rumicis Hoffm. Deuts. Fl. **2**: opp. *pl. 11*. 1795.
Uredo Phragmitis Schum. Enum. Pl. Saell. **2**: 231. 1803.
Puccinia arundinacea Hedw.; Poir. in Lam. Encyc. **8**: 250. 1808.
Uredo striola Strauss, Ann. Wett. Ges. **2**: 105. 1810.
Uredo rubella Spreng. Syst. Veg. **4**: 572, in part. 1827.
Puccinia Phragmitis Körn. Hedwigia **15**: 179. 1876.
Puccinia Trailii Plowr. Brit. Ured. 176. 1889.
Dicaeoma Phragmitis Kuntze, Rev. Gen. **3**^{3}: 470. 1898.
Puccinia rubella Arth. Bot. Gaz. **34**: 15. 1902.
Puccinia Aecidii-Rumicis Liro, Acta Soc. Faun. Fl. Fenn. **29**^{6}: 10. 1906.

O. Pycnia amphigenous, in small circular groups, crowded, inconspicuous, submerged, globoid in vertical section, 80–110 μ in diameter; ostiolar filaments 30–50 μ long.

I. Aecia hypophyllous, in large circular groups, 3–12 mm. in diameter, on purple-red, somewhat swollen spots, surrounding the pycnia, cupulate, small, 0.2–0.3 mm. in diameter; peridium colorless or pale-yellow, low, the margin recurved and finely lacerate; peridial cells broadly oblong or quadratic, 19–26 by 26–40 μ, abutted or slightly overlapping, the outer wall thick, 7–12 μ, smooth, the inner wall 2–4 μ, coarsely and strongly verrucose, with prominent, irregular tubercles; aeciospores globoid or oblong, 15–19 by 18–23 μ; wall colorless or nearly so, 2–4 μ thick, irregularly and unevenly verrucose.

ON POLYGONACEAE:
Rheum rhaponticum L., Nebraska.
Rumex altissimus Wood, Nebraska.
Rumex Britannica L. (*R. orbiculatus* A. Gray), Nebraska.
Rumex mexicanus Meisn. (*R. salicifolius* Hook.), North Dakota; Manitoba.
Rumex occidentalis S. Wats., Manitoba.
Rumex venosus Pursh, Oklahoma.

II. Uredinia amphigenous, scattered, prominent, oblong, 0.5–1 mm. long, cinnamon-brown, surrounded by discolored host-tissue, pulverulent, ruptured epidermis inconspicuous; urediniospores oblong-ellipsoid or obovoid, 18–21 by 29–34 μ; wall cinnamon-brown, thick, 3–4 μ, prominently echinulate, the pores 4, equatorial.

III. Telia amphigenous, scattered, prominent, oblong or broadly ellipsoid, 0.5–1 mm. long, chocolate-brown, early naked, prominently pulvinate, ruptured epidermis usually inconspicuous; teliospores oblong, 16–21 by 45–64 μ, rounded or acute above, capped by a hyaline umbo, rounded or tapering below, moderately or considerably constricted at septum; wall smooth, cinnamon-brown, 2–3 μ thick, somewhat thicker above, 4–7 μ; pedicel firm, often persistent, pale-yellow, very long, two to four times as long as spore.

ON POACEAE:
Phragmites Phragmites (L.) Karst. (*P. communis* Trin.), Colorado, Connecticut, Delaware, Illinois, Iowa, Kansas, Michigan, Minnesota, Nebraska, New York, North Dakota, Ohio, Wisconsin; Manitoba.
TYPE LOCALITY: Europe, on *Rumex* sp.
DISTRIBUTION: Connecticut and Delaware, westward to Manitoba, eastern Colorado and Oklahoma; also in Europe, Japan, Africa and South America.
ILLUSTRATIONS: Bot. Gaz. **34**: *16, f. 4s, t, u;* Krypt.-fl. Brand. Pilze **3**: *f. B97;* Rostr. Plantep. Haandb. *f. 91*.
EXSICCATI: Barth. Fungi Columb. *2466, 2967, 3072, 3262, 3564;* Barth. N. Am. Ured. *58, 358, 462, 760, 858, 859;* Brenckle, Fungi Dak. *187;* Carleton, Ured. Am. *36;* Ellis & Ev. Fungi Columb. *1577, 1657, 1658;* Seym. & Earle, Econ. Fungi *70*.

71. **Dicaeoma Magnusianum** (Körn.) Kuntze, Rev. Gen. 3³: 469. 1898.

Puccinia Magnusiana Körn. Hedwigia **15**: 179. 1876.
Puccinia simillima Arth. Bot. Gaz. **34**: 17. 1902.

O. Pycnia epiphyllous, numerous, gregarious, in indefinite groups on discolored areas, deep-orange when fresh, fading to cinnamon-brown, globose, 65–96 μ broad; ostiolar filaments 20–60 μ long.

I. Aecia hypophyllous and caulicolous, gregarious, in crowded groups 2–4 mm. across, cupulate, short, 0.2–0.3 mm. broad, bright-orange when fresh, becoming pale-orange on drying; peridium yellowish or almost colorless, the margin entire; peridial cells oblong in cross-section, 23–29 by 26–32 μ, abutted, the walls light-yellow, the outer 7–9 μ, finely striate, the inner 3–5 μ, rugose; aeciospores globoid, 21–23 by 23–26 μ; wall light-yellow, thin, 1–1.5 μ, finely and evenly verrucose.

ON RANUNCULACEAE:
Anemone canadensis L. (*A. pennsylvanica* L.), Iowa, Kansas, Nebraska, New York, North Dakota, South Dakota, Wisconsin.

II. Uredinia amphigenous, scattered, rather small, 0.3–0.5 mm. long, oblong, light-yellow, pulverulent, ruptured epidermis somewhat noticeable; paraphyses peripheral, clavate or cylindric, 10–21 μ broad by 39–80 μ high, the wall about 1 μ, thickened up to 5 μ above, light cinnamon-brown; urediniospores narrowly obovoid or oblong-clavate, 18–19 by 26–42 μ; wall light-yellow, of medium thickness, 1.5–2 μ, moderately and finely echinulate, the pores 6–8, scattered, rather obscure.

III. Telia numerous, amphigenous, small, about 0.5 mm. long, oblong, sometimes confluent in long lines on the sheaths, early naked, pulvinate, ruptured epidermis somewhat noticeable, blackish-brown; teliospores oblong or cylindric, 15–20 by 32–55 μ, acuminate, acute or less often obtuse above, narrowed at base, scarcely constricted at septum; wall dark cinnamon- or chestnut-brown, usually much lighter below, thin, 1–1.5 μ, much thicker at apex, up to 16 μ; pedicel firm, colorless, as long as spore or longer.

ON POACEAE:
Phragmites Phragmites (L.) Karst. (*P. communis* Trin.), Iowa, Nebraska, New York, North Dakota, South Dakota, Wisconsin; Manitoba.
TYPE LOCALITY: Europe, on *Phragmites communis*.
DISTRIBUTION: Central New York to Manitoba and Nebraska; also in Europe, South Africa, and Japan.
ILLUSTRATIONS: Bot. Gaz. **34**: *16, f. 4v, w, x;* McAlpine, Rusts Austr. *pl 2, f. 18;* Krypt.-fl. Brand. Pilze **3**: *f. B93.*
EXSICCATI: Barth. Fungi Columb. *3957;* Brenckle, Fungi Dak. *115, 292;* Ellis & Ev. N. Am. Fungi *2238;* D. Griff. W. Am. Fungi *94;* Sydow, Ured. *274, 2330.*

72. **Dicaeoma Windsoriae** (Schw.) Kuntze, Rev. Gen. 3³: 471. 1898.

Puccinia Windsoriae Schw. Trans. Am. Phil. Soc. II. **4**: 295. 1832.
Aecidium Pteleae Berk. & Curt.; Berk. Grevillea **3**: 60. 1874.
Puccinia omnivora Ellis & Ev. Bull. Torrey Club **22**: 59. 1895.
Dicaeoma omnivorum Kuntze, Rev. Gen. 3³: 469. 1898.

O. Pycnia epiphyllous, abundant, gregarious, honey-yellow fading to brownish, flattened-globoid in vertical section, 65 μ deep by 100–150 μ broad; ostiolar filaments 30–60 μ long.

I. Aecia hypophyllous and caulicolous, seldom epiphyllous, gregarious, in small crowded groups, 2–7 mm. across, cylindric, small, 0.2 mm. broad by 0.5 mm. high; peridium pale-yellow, the margin lacerate and recurved; peridial cells rhomboidal, 15–26 by 24–33 μ, overlapping, the outer wall striate, 7–11 μ, the inner wall tuberculose, 3–4 μ; aeciospores globoid or ellipsoid, 15–18 by 16–23 μ; wall light-yellow or nearly colorless, thin, 1–1.5 μ, finely verrucose.

ON RUTACEAE:
Ptelea trifoliata L., Alabama, Illinois, Indiana, Kansas, Kentucky, Maryland, Missouri, New York, Ohio, Virginia.

II. Uredinia amphigenous, scattered or sometimes confluent, linear, 0.3–1.5 mm. long, early naked, cinnamon-brown, ruptured epidermis conspicuous; urediniospores globoid or obovoid, 23–26 by 29–31 μ; wall golden-brown, 1.5–2 μ thick, verrucose, the pores 5 or 6, scattered.

III. Telia mostly hypophyllous and caulicolous, numerous, distinct or sometimes confluent, oblong, 0.5–1.5 mm. long, early naked, compact, dark chocolate-brown, ruptured epidermis conspicuous; teliospores ellipsoid or oblong, 15–20 by 29–37 μ, rounded above, rounded or tapering below, scarcely constricted at septum; wall chestnut-brown, 2–2.5 μ thick, 4–7 μ above; pedicel golden-brown, once to twice length of spore.

ON POACEAE:
Tridens flavus (L.) Hitchc. (*Windsoria poaeformis* Nutt., *Triodia cuprea* Jacq., *Tricuspis seslerioides* Torr., *Poa quinquefida* Pursh, *Sieglingia seslerioides* Scribn.), Alabama, Arkansas, Delaware, Illinois, Indiana, Kansas, Kentucky, Louisiana, Maryland, Missouri, Mississippi, New Jersey, North Dakota, Oklahoma, Pennsylvania, South Carolina, Tennessee, Texas, Virginia, West Virginia, Wisconsin; Ontario.
Tridens muticus (Torr.) Nash, Texas.
TYPE LOCALITY: Bethlehem, Pennsylvania, on "*Windsoria* (*Poa*) *quinquedentata*," now identified as *Tridens flavus*.
DISTRIBUTION: Southeastern New York to Ontario, North Dakota, Alabama, and Texas.
EXSICCATI: Barth. Fungi Columb. *2272, 4277, 4678, 5081, 5082;* Barth. N. Am. Ured. *173, 174, 977, 1181, 1780, 2036;* Ellis & Ev. N. Am. Fungi *1819, 3049;* Ellis & Ev. Fungi Columb. *342, 492, 1581, 1671;* Rab.-Wint. Fungi Eur. *3020;* Roum. Fungi Gall. *3859;* Seym. & Earle, Econ. Fungi *59, 88;* Sydow, Ured. *1735;* Zahlbr. Krypt. *2009*.

73. **Dicaeoma Redfieldiae** (Tracy) Kuntze, Rev. Gen. **3**[3]: 470. 1898.

Puccinia Redfieldiae Tracy, Jour. Myc. **7**: 281. 1893.

O and I. Pycnia and aecia unknown.

II. Uredinia amphigenous, few, narrowly oblong or linear, 1–3 mm. long, early naked, cinnamon-brown, pulverulent, ruptured epidermis conspicuous; urediniospores ellipsoid, 18–24 by 24–29 μ; wall golden- or cinnamon-brown, 2.5–3.5 μ thick, closely and rather finely verrucose, the pores 4, equatorial.

III. Telia amphigenous, numerous, often crowded and confluent, oblong or oblong-linear, 0.5–3 mm. long, early naked, rather compact, pulvinate, dark chocolate-brown, ruptured epidermis conspicuous; teliospores ellipsoid or broadly ellipsoid, 21–26 by 33–48 μ, rounded at both ends or obtuse above, slightly constricted at septum; wall chestnut-brown, smooth, 1.5–2 μ thick, moderately thickened above, 5–8 μ; pedicel slightly tinted or colorless, stout, once to twice length of spore.

ON POACEAE:
Redfieldia flexuosa (Thurber) Vasey, Kansas, Nebraska, North Dakota.
TYPE LOCALITY: Kansas, on *Redfieldia flexuosa*.
DISTRIBUTION: Southwestern North Dakota to central Kansas.
EXSICCATI: Barth. Fungi Columb. *2775;* Barth. N. Am. Ured. *56;* Brenckle, Fungi Dak. *466*.

74. **Dicaeoma Eatoniae** Arth. Proc. Ind. Acad. Sci. **1903**: 148. 1904.

Aecidium Ranunculi Schw. Schr. Nat. Ges. Leipzig 1: 67. 1822. Not *A. Ranunculi* Schum. 1803; nor *Dicaeoma Ranunculi* Kuntze, 1898.
Puccinia Eatoniae Arth. Jour. Myc. **10**: 18. 1904.

O. Pycnia hypophyllous, scattered over large areas, preceding or among the aecia, honey-yellow, flattened-globoid in vertical section, 90–110 μ broad by 70–80 μ high; ostiolar filaments 60–70 μ long.

I. Aecia hypophyllous, unevenly scattered over large areas, from a distributed mycelium, low-cupulate, 0.3–0.5 mm. in diameter, not accompanied by hypertrophy; peridium colorless, short, the margin recurved and irregularly eroded; peridial cells angularly ellipsoid, 13–23 by 23–32 μ, overlapping, the outer wall smooth, thick, 6–8 μ, transversely striate, the inner wall coarsely verrucose, thinner, 3–4 μ; aeciospores globoid or ellipsoid, 13–16 by 16–23 μ; wall colorless or pale-yellow, about 1.5 μ thick, finely and evenly verrucose.

ON RANUNCULACEAE:
Ranunculus abortivus L., Delaware, Illinois, Indiana, Iowa, Michigan, Missouri, New York, North Carolina, North Dakota, Ohio, Pennsylvania, South Carolina, South Dakota, West Virginia, Wisconsin; Ontario.
Ranunculus calthaeflorus Greene, Colorado.
Ranunculus micranthus Nutt. (*R. abortivus micranthus* A. Gray), West Virginia.

II. Uredinia chiefly epiphyllous, scattered, numerous, elliptic or oblong, small, 0.3–0.8 mm. long, cinnamon-brown, rather tardily naked, ruptured epidermis noticeable; urediniospores broadly ellipsoid or ellipsoid, 15–18 by 19–24 μ; wall golden-yellow, moderately thin, 1–1.5 μ, finely and closely echinulate, the pores 6–8, scattered.

III. Telia chiefly hypophyllous and caulicolous, oblong or linear, small, 0.3–0.8 mm. in length, blackish-brown, long covered by the epidermis, bordered by a layer of brownish stromal hyphae; teliospores germinating at maturity, clavate-oblong or cylindric, 13–21 by 32–48 μ, truncate or rounded above, narrowed below, slightly or not constricted at septum; wall thin, about 1 μ, light chestnut-brown, darker and slightly thickened above, 3–5 μ, smooth; pedicel short, dark like upper part of spore.

ON POACEAE:

Sphenopholis nitida (Spreng.) Scribn. (*Eatonia Dudleyi* Vasey, *E. nitida* Nash), Delaware, Mississippi, South Carolina, Virginia.

Sphenopholis obtusata (Michx.) Scribn. (*Eatonia obtusata* A. Gray, *E. pubescens* Scribn. & Merr.), Florida, Iowa, Kansas, Mississsippi, Nebraska, North Dakota, Oklahoma, South Dakota, Wisconsin.

Sphenopholis pallens (Spreng.) Scribn. (*Eatonia pennsylvanica* A. Gray), Delaware, Indiana, Iowa, Nebraska, New York, North Dakota, Ohio, South Dakota, West Virginia; Ontario.

TYPE LOCALITY: North Carolina, on *Ranunculus abortivus*.

DISTRIBUTION: Northern New York and Ontario to North Dakota, and southward to Florida and Oklahoma.

EXSICCATI: Barth. Fungi Columb. *3653;* Barth. N. Am. Ured. *434, 1042, 1648;* Brenckle, Fungi Dak. *184, 443;* Ellis & Ev. Fungi Columb. *2107;* Ellis, N. Am. Fungi *1003b;* D. Griff. W. Am. Fungi *278;* Kellerm. Ohio Fungi *62;* Rab.-Wint.-Paz. Fungi Eur. *3837;* Seym. & Earle, Econ. Fungi *94, 95;* Sydow, Ured. *1222*.

75. **Dicaeoma Koeleriae** (Arth.) Arthur & Fromme.

Puccinia Koeleriae Arth. Mycologia 1: 247. 1909.

O. Pycnia chiefly epiphyllous, numerous, gregarious, in circular groups 0.5–3 mm. across, on discolored spots 1–7 mm. in diameter, punctiform, honey-yellow becoming brownish, flattened-globoid, 80–100 μ broad by 45–65 μ high; ostiolar filaments 35–50 μ long.

I. Aecia hypophyllous, numerous, in crowded circular groups 1–3 mm. or more across, on discolored spots 1–7 mm. in diameter, short-cylindric, 0.4–1 mm. high by 0.2–0.3 mm. in diameter; peridium colorless, somewhat evanescent; peridial cells rhomboidal, 16–26 μ by 16–35 μ, overlapping, the outer wall rather thick, 7–13 μ, smooth, transversely striate, the inner wall moderately thin, 3–4 μ, verrucose; aeciospores globoid, 16–23 by 18–26 μ; wall colorless, uniformly thin, 1–2 μ, evenly and finely verrucose.

ON BERBERIDACEAE:

Mahonia Aquifolium (Pursh) Nutt. (*Berberis Aquifolium* Pursh, *B. repens* Lindl., *B. nana* Greene, *Odostemon Aquifolium* Rydb.), Colorado, Idaho, Montana, Oregon; British Columbia.

Mahonia diversifolia Sweet (*Berberis Aquifolium* Lindl., *Odostemon nutkanus* Rydb.), Idaho, Oregon; British Columbia.

Mahonia nervosa (Pursh) Nutt. (*Berberis nervosa* Pursh), British Columbia.

II. Uredinia amphigenous, in small groups, oblong or linear, 0.5–1.5 mm. long, soon naked, pulverulent, cinnamon-brown, ruptured epidermis conspicuous; paraphyses numerous, intermixed, capitate or clavate-capitate, 10–19 by 42–100 μ, the wall smooth, 1.5–4 μ thick, pale golden-yellow or colorless; urediniospores ellipsoid, 19–26 by 23–32 μ; wall cinnamon-brown, thin, 1–1.5 μ, finely and closely or moderately verrucose-echinulate, the pores 8–10, scattered.

III. Telia hypophyllous, scattered, sometimes confluent, oblong or linear, 0.5–1.5 mm. in length, long covered by the epidermis, bordered by a thin stroma, grayish-black; teliospores clavate or oblong-clavate, 13–21 by 45–64 μ, obtuse or truncate above, narrowed below, slightly or not constricted at septum; wall chestnut-brown, paler near the base, thin, about 1 μ, slightly thickened at apex, 3–5 μ, smooth; pedicel short, at the attachment colored like apex, paler below.

ON POACEAE:

Koeleria cristata (L.) Pers. (*K. gracilis* Pers.), Colorado, Montana, New Mexico, North Dakota, Oregon, Utah.

TYPE LOCALITY: Ouray, Colorado, on *Koeleria cristata*.

DISTRIBUTION: Western North Dakota to British Columbia, and southward to New Mexico.

EXSICCATI: Barth. Fungi Columb. *3068;* Barth. N. Am. Ured. *1853*.

76. **Dicaeoma Liatridis** (Ellis & And.) Arthur & Fromme.

Aecidium compositarum Liatri[*dis*] Webber, Bull. Neb. Exp. Sta. **1**: 60; hyponym. 1889.
Aecidium compositarum Liatridis Webber, Ann. Rep. Neb. Board Agr. **1889**: 210. 1890.
Aecidium Liatridis Ellis & And. Bot. Gaz. **16**: 47. 1891.
Puccinia Liatridis Bethel; Arth. Mycologia 9: 301. 1917.

O. Pycnia amphigenous, rather loosely arranged in discolored areas 1–5 mm. across, noticeable, yellowish or light chestnut-brown, globoid, 93–144 μ broad; ostiolar filaments 35–64 μ long.

I. Aecia amphigenous, crowded, usually surrounding pycnia on yellowish or reddish spots 3–5 mm. in diameter, cupulate or short-cylindric, 0.2–0.3 mm. in diameter; peridium nearly colorless, the margin erose, recurved; peridial cells rhomboidal in longitudinal section, 16–27 by 29–40 μ, overlapping, the outer wall 5–10 μ thick, transversely striate, nearly or quite smooth, the inner wall 2–4 μ thick, finely verrucose; aeciospores globoid to ellipsoid, 16–24 by 19–29 μ; wall colorless, thin, 1–1.5 μ, closely verrucose.

ON CARDUACEAE:
Lacinaria punctata (Hook.) Kuntze (*Liatris punctata* Hook.), Colorado, Nebraska, North Dakota.
Lacinaria scariosa (L.) Hill (*Liatris scariosa* Willd.), Kansas, North Dakota, Wisconsin.
Lacinaria spicata (L.) Kuntze (*Liatris spicata* Willd.), Nebraska.
Lacinaria squarrosa (L.) Hill, Nebraska.

II. Uredinia epiphyllous, scattered, intercostal, elliptic, 0.5 mm. long, early naked, pulverulent, orange-yellow; paraphyses none; urediniospores ellipsoid, 18–23 by 23–30 μ; wall pale-yellow, or with a pale-brownish cast at maturity, moderately thin, 1.5–2 μ, finely and rather closely echinulate, the pores scattered, about 6–8, usually indistinct.

III. Telia hypophyllous, numerous, crowded, oblong, 0.5–1 mm. in length, blackish-brown, long covered by the epidermis, surrounded by hyphal stromata; teliospores irregularly oblong or clavate-oblong, 16–29 by 42–55 μ, truncate or obtuse above, narrowed below, slightly or not constricted at septum; mesospores occasional; wall dark chestnut-brown, paler below, 1–2 μ thick, moderately thickened above, 5–7 μ; pedicel tinted, very short.

ON POACEAE:
Agrostis hyemalis (Walt.) B.S.P., New Mexico.
Koeleria cristata (L.) Pers. (*K. gracilis* Pers.), Colorado, New Mexico, North Dakota, South Dakota, Wisconsin.
TYPE LOCALITY: Anselmo, Nebraska, on *Liatris scariosa*.
DISTRIBUTION: Northwestern Wisconsin to North Dakota, and southward to southern New Mexico on the plains and foothills.
EXSICCATI: Barth. Fungi Columb. *2603, 2902;* Barth. N. Am. Ured. *1766, 2045;* Brenckle, Fungi Dak. *82, 101, 401;* Carleton, Ured. Am. *38;* Sydow, Ured. *2318, 2347*.

77. **Dicaeoma** (?) **Zeugitis** (Arth. & Holway) Arthur & Fromme.

Uredo Zeugitis Arth. & Holway; Arth. Am. Jour. Bot. **5**: 538. 1918.

O and I. Pycnia and aecia unknown.

II. Uredinia chiefly hypophyllous, scattered, elliptic, small, 0.3–0.5 mm. long, rather tardily naked, cinnamon-brown, ruptured epidermis evident; urediniospores broadly ellipsoid, 19–21 by 23–26 μ; wall cinnamon-brown, moderately thick, 1.5–2.5 μ, finely and closely echinulate, the pores 3, sometimes 4, equatorial.

III. Telia unknown.

ON POACEAE:
Senites Hartwegi (Fourn.) Arth. (*Zeugites Hartwegi* Fourn.), Guatemala.
TYPE LOCALITY: San Rafael, Department of Guatemala, Guatemala, on *Zeugites Hartwegi*.
DISTRIBUTION: Known only from the type locality.

78. **Dicaeoma paradoxicum** (Ricker) Arthur & Fromme.

Puccinia paradoxica Ricker, Jour. Myc. **11**: 114. 1905.

O and I. Pycnia and aecia unknown.

II. Uredinia not seen; urediniospores in telia globoid or broadly ellipsoid, 18–23 by 21–24 μ; wall brownish-yellow or light-yellow, thick, 2–2.5 μ, moderately and conspicuously echinulate, the pores 6–9, scattered.

III. Telia hypophyllous, scattered, elliptic or oblong-linear, small, 0.5–1 mm. long, becoming naked by the longitudinal rupture of the epidermis, chestnut-brown, ruptured epidermis apparent; teliospores ellipsoid, 20–26 by 32–38 μ, rounded at both ends, conspicuously constricted at septum; wall chestnut-brown, uniformly 2–2.5 μ thick, verrucose with prominent irregular warts; pedicel colorless, sometimes attached laterally or at an angle, short, fragile.

ON POACEAE:
Melica Smithii (Porter) Vasey (*Avena Smithii* Porter), Michigan.
TYPE LOCALITY: Chatham Station, Michigan, on *Melica Smithii*.
DISTRIBUTION: Known only from the type locality in northern Michigan.

79. **Dicaeoma epiphyllum** (L.) Kuntze, Rev. Gen. **3**^{3}: 468. 1898.

Lycoperdon epiphyllum L. Sp. Pl. 1185. 1753.
Aecidium Tussilaginis Pers. in J. F. Gmel. Syst. Nat. **2**: 1473. 1791.
Lycoperdon Farfarae Duval, Bot. Tasch. Hoppe **1793**: 257. 1793.
Aecidium compositarum Mart. Fl. Crypt. Erlang. 314. 1817.
Puccinia Poarum Nielsen, Bot. Tidsskr. III. **2**: 34. 1877.
Myxosporium Tussilaginis Sacc. Myc. Ven. *993*. 1877.
Aecidiolum Tussilaginis Sacc. Michelia **1**: 242. 1878.
Uredo Boutelouae Arth. Bull. Iowa Agr. Coll. Dep. Bot. **1884**: 164. 1884.
Puccinia epiphylla Wettst. Verh. Zool.-Bot. Ges. Wien **35**: 541. 1886.
Uredo Airae Lagerh., Jour. de Bot. **2**: 432. 1888.
Aecidium Petasitidis Sydow, Oesterr. Bot. Zeits. **51**: 20. 1901.
Uredo anthoxanthina Bubák, Ann. Myc. **3**: 223. 1905.
Puccinia Deschampsiae Arth. Bull. Torrey Club **37**: 570. 1910.

O. Pycnia epiphyllous, few, in crowded circular groups, on discolored spots 2–5 mm. in diameter, honey-yellow becoming brownish, inconspicuous, globoid in vertical section, 130–155 μ in diameter; ostiolar filaments short.

I. Aecia hypophyllous, crowded in circular groups 2–5 mm. across, on discolored spots, cupulate, 0.3–0.5 mm. in diameter; peridium low, colorless, the margin finely erose, somewhat recurved, peridial cells angularly oblong or rhomboidal, the outer wall smooth, transversely striate, thick, 7–12 μ, the inner wall verrucose, somewhat thinner, 3–7 μ; aeciospores angularly globoid or oblong, 15–21 by 19–26 μ; wall colorless or very pale-yellow, thin, 1–1.5 μ, very minutely and closely verrucose, appearing smooth when wet.

ON CARDUACEAE:
Petasites corymbosa (R. Br.) Rydb. (*P. palmata frigida* Macoun, *Tussilago corymbosa* R. Br.), Alaska.
Petasites frigida (L.) Fries, Alaska.
Tussilago Farfara L., Nova Scotia.

II. Uredinia chiefly epiphyllous, scattered, round or oblong, 0.1–0.3 mm. broad by 0.2–0.5 mm. long, soon naked, pulverulent, orange-yellow or cinnamon-brown, ruptured epidermis apparent; paraphyses chiefly peripheral, very numerous, variously bent and incurved, capitate with narrow neck and linear-clavate pedicel which is often solid, or sometimes clavate-capitate, 10–16 by 48–80 μ, the wall smooth, light golden-brown, 2–4 μ thick; urediniospores ellipsoid, 16–24 by 19–29 μ; wall colorless or golden-yellow, thin, 1–1.5 μ, occasionally 2 μ, closely and rather prominently echinulate, the pores 8–10, scattered, usually distinct.

III. Telia hypophyllous, few, scattered, oblong, 0.3–1 mm. in length, pulvinate, dark-gray, long covered by the epidermis, bordered by a thin layer of stromal hyphae; teliospores oblong, clavate or cylindric, 15–23 by 34–61 μ, truncate, rounded or obtuse above, usually narrowed below, slightly or not constricted at septum; wall dark chestnut-brown above, paler below, thin, 1–1.5 μ, slightly thickened above, 3–5 μ; pedicel very short, tinted.

ON POACEAE:
Alopecurus alpinus L. (*A. occidentalis* Scribn.), Colorado.
Alopecurus aristulatus Michx. (*A. fulvus* Smith, *A. geniculatus aristulatus* Torr), Utah.
Alopecurus geniculatus L., Indiana, Nebraska.
Anthoxanthum odoratum L., Maine; Nova Scotia.
Catabrosa aquatica (L.) Beauv. (*Aira aquatica* L.), Nebraska, Utah.
Deschampsia caespitosa (L.) Beauv. (*Aira alpina* L., *A. caespitosa* L.), Colorado; Alberta.
Festuca Myuros L., Mexico (state).
Phleum alpinum L., Colorado.
Poa alpina L., Colorado.
Poa ampla Merrill, Oregon.
Poa annua L. (*P. infirma* H.B.K.), California, Delaware, New York, Oregon; Alberta; Mexico (state); Guatemala.
Poa arachnifera Torr., Tennessee.

Poa arida Vasey (*P. pratericola* Rydb.), Nebraska.
Poa Bigelovii Vasey & Scribn., New Mexico.
Poa compressa L., Colorado, North Dakota.
Poa interior Rydb., Colorado, Idaho; Alberta.
Poa longipedunculata Scribn., Utah.
Poa macrantha Vasey, Oregon.
Poa nemoralis L., Alberta.
Poa palustris L. (*P. triflora* Gilib., *P. serotina* Ehrh.), Colorado, New York, Oregon, West Virginia, Wisconsin.
Poa pratensiformis Rydb. (*P. pseudopratensis* Scribn. & Rydb. not Beyer), Colorado, Wyoming.
Poa pratensis L., Alaska, California, Colorado, Connecticut, Delaware, Idaho, Indiana, Iowa, Kansas, Kentucky, Maine, Massachusetts, Michigan, Missouri, Montana, Nebraska, New Mexico, New York, North Carolina, North Dakota, Ohio, Oregon, Pennsylvania, South Dakota, Utah, Washington, Wisconsin; Ontario, Quebec.
Poa reflexa Vasey & Scribn., Utah.
Poa Vaseyochloa Scribn. (*P. pulchella* Vasey, not Salisb.), Washington.

TYPE LOCALITY: Europe, on *Tussilago Farfara*.

DISTRIBUTION: Almost throughout continental North America in the uredinial form, but the aecia and telia only in alpine and boreal stations, especially westward; also in Europe and Japan.

ILLUSTRATIONS: McAlpine, Rusts Austr. *pl. 3, f. 22;* Krypt.-fl. Brand. Pilze **3**: *f. B176;* Corda, Ic. Fung. **3**: *pl. 3, f. 45*.

EXSICCATI: Barth. Fungi Columb. *2772, 2773, 3175, 3260, 3362, 3565, 3959, 4367, 4661, 4669;* Barth. N. Am. Ured. *654, 761, 860, 957, 958, 1147, 1265, 1466, 1962, 2145, 2244;* Brenckle, Fungi Dak. *291;* Clements, Crypt. Form. Colo. *558, 573;* Ellis & Ev. Fungi Columb. *1862, 1971;* Garrett, Fungi Utah. *87, 103,104*.

80. **Dicaeoma abundans** (Peck) Arthur & Fromme.

Aecidium abundans Peck, Bot. Gaz. **3**: 34. 1878.
Puccinia Crandallii Pammel & Hume; Hume, Proc. Davenport Acad. **7**: 250. 1899.
Puccinia Kreageri Ricker, Jour. Myc. **11**: 114. 1905.
Dicaeoma Crandallii Arth. Résult. Sci. Congr. Bot. Vienne 344. 1906.
Puccinia abundans H. S. Jackson, Brooklyn Bot. Gard. Mem. **1**: 229. 1918.

O. Pycnia epiphyllous, numerous, gregarious, in small groups on discolored areas, light-yellow, inconspicuous, flask-shaped, 75–100 μ broad by 100–125 μ high; ostiolar filaments 40–60 μ long.

I. Aecia hypophyllous, gregarious, in crowded groups 2–4 mm. across, on discolored areas, cylindric, 0.3–0.4 mm. in diameter, about 0.5 mm. high; peridium whitish, the margin finely lacerate; peridial cells oblong or rhomboidal, 26–29 by 35–39 μ, the walls conspicuously rugose, the outer 5–7 μ thick, the inner slightly thinner; aeciospores globoid or ellipsoid, 18–26 by 21–33 μ; wall colorless, moderately thick, 1.5–2 μ, evenly and finely verrucose.

ON CAPRIFOLIACEAE:
Symphoricarpos albus (L.) Blake (*S. racemosus* Michx., *S. pauciflorus* Britton), California, Colorado, Idaho, Montana, Nebraska, Oregon, Washington, Wyoming; British Columbia.
Symphoricarpos occidentalis Hook., Colorado, Montana, North Dakota, Wyoming; Saskatchewan.
Symphoricarpos orbiculatus Moench, Missouri, Oklahoma.
Symphoricarpos oreophilus A. Gray, Colorado, Idaho, Montana, Utah, Wyoming.
Symphoricarpos Symphoricarpos (L.) MacM. (*S. vulgaris* Michx.), Kansas, Missouri, Oklahoma.
Symphoricarpos vaccinioides Rydb., Montana, Utah, Wyoming.
Symphoricarpos sp., British Columbia.

II. Uredinia hypophyllous, oval, 0.5–1 mm. long, soon naked, pulverulent, light chestnut-brown, ruptured epidermis conspicuous; urediniospores ellipsoid or obovoid, 23–27 by 29–35 μ; wall light-yellow, moderately thick, 2–2.5 μ, moderately and finely echinulate, the pores 6–8, scattered.

III. Telia hypophyllous, numerous, crowded and often confluent, ovate or oblong, 0.5–2 mm. long, pulvinate, dark-brown, early naked, ruptured epidermis noticeable; teliospores ellipsoid or occasionally cylindric, 15–24 by 35–50 μ, rounded or sometimes truncate above, moderately constricted at septum; wall cinnamon-brown at sides, darker above, 1.5–2.5 μ thick, 5–12 μ at apex; pedicel pale cinnamon-brown, firm, one to one and a half times length of spore.

ON POACEAE:
Festuca confinis Vasey (*Poa Kingii* S. Wats.), California, Colorado, Utah, Wyoming.
Festuca idahoensis Elmer (*F. ovina ingrata* Hack., *F. ingrata* Rydb.), Colorado, Montana, Oregon, Wyoming.
Festuca occidentalis Hook., Colorado.
Festuca ovina L., North Dakota.

Festuca rubra L., Oregon, Wyoming.
Festuca subulata Trin. (*F. Jonesii* Vasey), Oregon, Washington.
Poa brevipaniculata Scribn. & Williams, Colorado.
Poa longiligula Scribn. & Williams, Colorado.

TYPE LOCALITY: Colorado on *Symphoricarpos oreophilus*.

DISTRIBUTION: North Dakota to British Columbia, and southward to Oklahoma and central California.

EXSICCATI: Barth. Fungi Columb. *2262, 4660;* Barth. N. Am. Ured. *836, 1435, 1643, 1839, 2130;* Brenckle, Fungi Dak. *76, 81;* Clements, Crypt. Form. Colo. *556, 579;* Ellis & Ev. Fungi Columb. *873, 1701;* Ellis & Ev. N. Am. Fungi *1814;* Garrett, Fungi Utah. *19, 176, 184, 185;* D. Griff. W. Am. Fungi *295;* Rab.-Wint. Fungi Eur. *3016;* Roum. Fungi Gall. *3866;* Sydow, Ured. *1950;* Vesterg. Micr. Rar. Sel. *1001*.

81. **Dicaeoma Cockerellianum** (Bethel) Arthur & Fromme.

Puccinia Cockerelliana Bethel; Arth. Bull. Torrey Club **46**: 113. 1919.

O. Pycnia amphigenous, opposite or surrounded by the aecia, few, honey-yellow becoming brownish, flattened-globoid, 107–128 μ broad by 65–103 μ high; ostiolar filaments 40–60 μ long.

I. Aecia hypophyllous or caulicolous, in small crowded groups 3 mm. or less across, on slightly larger discolored spots, low-cupulate or somewhat bullate, 0.3–0.4 mm. in diameter; peridium colorless, opening by a central pore, soon disappearing; peridial cells rhombic, 16–23 by 27–35 μ, the outer wall thick, 6–8 μ, smooth, transversely striate, the inner wall thinner, 2–3 μ, coarsely verrucose; aeciospores angularly globoid or ellipsoid, 18–24 by 20–29 μ; wall pale-yellow or colorless, moderately thick, 1.5–2.5 μ, finely and evenly verrucose.

ON RANUNCULACEAE:
Thalictrum Fendleri Engelm., Colorado.

II. Uredinia epiphyllous, few, intercostal, oblong-linear, 0.5–1 mm. long, cinnamon-brown, pulverulent, ruptured epidermis evident; urediniospores ellipsoid, 19–26 by 24–32 μ; wall colorless or nearly so, moderately thin, 1.5–2 μ, finely and moderately echinulate, the pores obscure, probably scattered.

III. Telia epiphyllous, scattered or in small groups, intercostal, oblong or linear, 1–2 mm. long, grayish-black, long covered by the epidermis but becoming exposed by longitudinal slits, without stromal hyphae; teliospores cylindric or clavate-cylindric, 13–21 by 50–85 μ, rounded or truncate above, tapering to base, the upper cell about one third length of spore, slightly or not constricted at septum; wall chestnut-brown above, paler below, thin, about 1 μ, moderately thickened at apex, 3–7 μ; pedicel short, tinted.

ON POACEAE:
Festuca Thurberi Vasey, Colorado.

TYPE LOCALITY: Lake Eldora, Colorado, on *Festuca Thurberi*.

DISTRIBUTION: High altitudes in Colorado.

EXSICCATI: Barth. N. Am. Ured. *616*.

82. **Dicaeoma Piperi** (Ricker) Arthur & Fromme.

Puccinia Piperi Ricker, Jour. Myc. 11: 114. 1905.

O and I. Pycnia and aecia unknown.

II. Uredin ia amphigenous, scattered or somewhat grouped, oblong or linear, 0.5–2 mm. long, rather tardily naked, pulverulent, golden-brown, ruptured epidermis conspicuous; urediniospores globoid or ellipsoid, 15–18 by 21–26 μ; wall pale- or golden-yellow, 1.5–2 μ thick, moderately and finely echinulate, the pores 8–10, scattered.

III. Telia hypophyllous, often confluent in small groups, oblong or linear, 0.5–2 mm. long, grayish-black, long covered by the epidermis, bordered by a thin brownish stroma; teliospores oblong or oblong-clavate, 19–26 by 42–62 μ, rounded or truncate above, usually narrowed below, slightly constricted at septum; wall moderately thick, 1.5–2.5 μ, sometimes slightly thickened above, up to 5 μ, dark chestnut-brown, frequently with a few longitudinal angles giving a striated appearance; pedicel colorless, one half to once length of spore; mesospores rather common.

ON POACEAE:
Festuca elatior L., Utah.
Festuca pacifica Piper, California, Oregon.

TYPE LOCALITY: Eight Dollar Mountain, Oregon, on *Festuca pacifica*.

DISTRIBUTION: Oregon to Utah and southern California.

83. **Dicaeoma Pattersonianum** (Arth.) Arthur & Fromme.

Puccinia Pattersoniana Arth. Bull. Torrey Club **33**: 29. 1906.

O and I. Pycnia and aecia unknown.

II. Uredinia epiphyllous, oblong, early naked; urediniospores broadly ellipsoid or obovoid, 21–30 by 29–39 μ; wall golden-yellow, 2–3 μ thick, sparingly and prominently echinulate, the pores 8–10, scattered.

III. Telia epiphyllous, intercostal, oblong-linear, 0.5–2 mm. long, early naked, chestnut-brown, ruptured epidermis noticeable; teliospores ellipsoid or oblong, 16–23 by 29–37 μ, usually rounded at both ends, moderately constricted at septum; wall cinnamon- or light chestnut-brown, uniformly thin, 1–1.5 μ, appearing smooth when wet, finely and closely longitudinally striate when dry; pedicel colorless, fragile, as long as spore or longer.

ON POACEAE:
Agropyron spicatum (Pursh) Scribn. & Smith (*A. divergens* Nees), Montana, Oregon.
Agropyron sp., Utah.
Elymus condensatus Presl, Utah.
Elymus triticoides Buckl., New Mexico.
Sitanion jubatum J. G. Smith, Washington.
TYPE LOCALITY: Sandcoulee, Cascade County, Montana, on *Agropyron spicatum*.
DISTRIBUTION: Montana and Oregon to Utah and New Mexico.
EXSICCATI: Garrett, Fungi Utah. *189;* D. Griff. W. Am. Fungi *268* in part.

84. **Dicaeoma procerum** (Dietel & Holway) Kuntze, Rev. Gen. **3**^{3}: 469. 1898.

Puccinia procera Dietel & Holway, Erythea **1**: 249. 1893.

O and I. Pycnia and aecia unknown.

II. Uredinia chiefly epiphyllous, scattered, elliptic or oblong-linear, 0.3–0.6 mm. long, tardily naked, cinnamon-brown, ruptured epidermis conspicuous; urediniospores obovoid or ellipsoid, 26–32 by 32–48 μ; wall moderately thick, 1.5–2.5 μ, golden- or cinnamon-brown, finely and moderately echinulate, the pores scattered, about 8.

III. Telia hypophyllous, scattered, on brownish areas, oblong-linear, 0.3–0.6 mm. long, grayish-black, long covered by the epidermis, bordered by a thin layer of dark stromal hyphae; teliospores oblong or cylindric, 15–23 by 45–80 μ, truncate or angled above, usually narrowed below, slightly or not constricted at septum; wall thin, 1–1.5 μ, light chestnut-brown, somewhat darker and thicker at apex, 3–7 μ; pedicel short, dark chestnut-brown.

ON POACEAE:
Elymus arenicola Scribn. & Smith, Oregon.
Elymus condensatus Presl, California.
Elymus mollis Trin., California.
TYPE LOCALITY: Pasadena, California, on *Elymus condensatus*.
DISTRIBUTION: Along the coast from Oregon to southern California.
EXSICCATI: Barth. N. Am. Ured. *658, 659;* Ellis & Ev. Fungi Columb. *867, 868*.

85. **Dicaeoma montanense** (Ellis) Kuntze, Rev. Gen. **3**^{3}: 469. 1898.

Puccinia montanensis Ellis, Jour. Myc. **7**: 274. 1893.
Aecidium Fendleri Tracy & Earle, in Greene, Pl. Baker. **1**: 17. 1901.
Puccinia Fendleri H. S. Jackson, Brooklyn Bot. Gard. Mem. **1**: 246. 1918.

O. Pycnia chiefly epiphyllous, gregarious in circular groups 1–3 mm. across, on yellowish or reddish spots 3–10 mm. across, punctiform, honey-yellow becoming brownish, globoid, 90–130 μ in diameter; ostiolar filaments 65–95 μ long, agglutinate to form a short column.

I. Aecia hypophyllous, crowded in circular groups 1–10 mm. across upon yellowish or reddish spots, cupulate or cylindric, 0.1–0.3 mm. broad by 0.5–2 mm. high; peridium colorless, the margin recurved, erose; peridial cells rhombic, 19–26 by 26–32 μ, abutted or slightly overlapping, the outer wall rather thick, 9–13 μ, transversely striate, smooth, the inner wall thinner, 3–4 μ, closely and coarsely verrucose; aeciospores ellipsoid, globoid or oblong, 18–23 by20–30 μ; wall colorless, thin, 1–1.5 μ, very closely and finely verrucose.

ON BERBERIDACEAE:
Berberis Fendleri A. Gray, Colorado, New Mexico.

II. Uredinia chiefly epiphyllous, usually in long lines between the veins, broadly elliptic, small, about 0.3 mm. long, cinnamon-brown, early naked, ruptured epidermis apparent;

paraphyses numerous, capitate or clavate, peripheral, 11–22 by 35–64 μ, the wall thin, about uniform, smooth, colorless; urediniospores ellipsoid, 19–26 by 21–32 μ; wall yellow or pale cinnamon-brown, moderately thin, 1.5–2 μ, finely and closely echinulate, the pores 8–10, scattered.

III. Telia chiefly hypophyllous, often confluent or contiguous in long lines, oblong or linear, 0.3–1.5 mm. long, dark blackish-gray, long covered by the epidermis, compound, surrounded by dark hyphal stromata; teliospores irregularly oblong or clavate, 18–34 by 35–64 μ, truncate, rounded or angled above, narrowed below, slightly constricted at septum; wall cinnamon- or chestnut-brown, rather thick, 1.5–2.5 μ, darker and thicker above, 3–7 μ; pedicel tinted, very short, largely deciduous.

ON POACEAE:

Agropyron caninum (L.) Beauv., Colorado.
Agropyron dasystachyum (Hook.) Scribn., Alberta.
Agropyron pseudorepens Scribn. & Smith, Colorado.
Agropyron Smithii Rydb. (*A. occidentale* Scribn.), Colorado, Nebraska, North Dakota, South Dakota; Manitoba.
Agropyron Smithii Palmeri (Scribn. & Smith) A. Heller (*A. Palmeri* Rydb.), Colorado.
Agropyron tenerum Vasey, Colorado, Iowa, Kansas, Montana, New Mexico, North Dakota, South Dakota, Utah.
Elymus canadensis L. (*E. robustus* Scribn. & Smith), Colorado, Indiana, Iowa, Kansas, Minnesota, Missouri, Nebraska, New Mexico, North Dakota, South Dakota, Utah, Wisconsin; Manitoba.
Elymus condensatus Presl, Montana, Nebraska.
Elymus glaucus Buckl. (*E. americanus* Vasey & Scribn.), Colorado, Nebraska, Utah.
Elymus Macounii Vasey, Colorado.
Elymus robustus Scribn. & Smith, Iowa.
Elymus striatus Willd., Iowa, Nebraska, North Dakota.
Elymus virginicus L., Colorado, Kentucky, Nebraska, South Dakota.
Hordeum jubatum L., Colorado, Utah; Alberta.
Hystrix Hystrix (L.) Millsp. (*H. patula* Moench, *Asprella Hystrix* Willd.), Iowa.
Sitanion Hystrix (Nutt.) J. G. Smith, (*E. elymoides* Raf., *S. brevifolius* J. G. Smith), Colorado.

TYPE LOCALITY: Helena, Montana, on *Elymus condensatus*.

DISTRIBUTION: Wisconsin to British Columbia, and southward to New Mexico and southern California, chiefly in the semiarid plains and mountains of the west, and locally in the Catskill mountains, New York.

EXSICCATI: Barth. Fungi Columb. *3453, 3930, 4562, 4857;* Barth. N. Am. Ured. *22, 327, 328, 529, 1522, 1858, 2146, 2156;* Brenckle, Fungi Dak. *128, 367;* Carleton, Ured. Am. *22;* Ellis & Ev. Fungi Columb. *2070;* Ellis & Ev. N. Am. Fungi *2892;* Garrett, Fungi Utah. *139;* Seym. & Earle, Econ. Fungi *396;* Sydow, Ured. *2420*.

86. **Dicaeoma Asperifolii** (Pers.) Kuntze, Rev. Gen. 3³: 466. 1898.

Aecidium Asperifolii Pers. Obs. Myc. 1: 97. 1796.
Aecidium Lycopsidis Desv. Jour. de Bot. Desv. **2**: 311. 1809.
Uredo rubigo-vera DC. Fl. Fr. **6**: 83. 1815.
Caeoma borragineatum Link, in Willd. Sp. Pl. **6²**: 48. 1825.
Puccinia recondita Roberge; Desmaz. Bull. Soc. Bot. Fr. **4**: 798. 1858.
Puccinia straminis Fuckel, Enum. Fung. 9. 1861.
Puccinia rubigo-vera Wint. in Rab. Krypt. Fl. **1¹**: 217. 1881.
Puccinia Asperifolii Wettst. Verh. Zool.-Bot. Ges. Wien **35**: 541. 1886.
Puccinia dispersa Eriksson, Zeits. Pflanzenkr. **4**: 257. 1894.
Aecidium Anchusae Eriksson & Henn. Getreider. 210. 1896.
Puccinia secalina Grove, Brit. Rust Fungi 261. 1913.

O. Pycnia epiphyllous, few, globoid in vertical section, 110–160 μ in diameter; ostiolar filaments 60–105 μ high.

I. Aecia hypophyllous, in crowded circular groups 5–10 mm. across, cupulate, 0.3–0.5 mm. in diameter; peridium yellowish, low, the margin irregularly eroded and recurved; peridial cells oblong or rhomboidal, 18–26 by 29–35 μ, overlapping, the outer wall smooth, thick, 7–10 μ, transversely striate, the inner wall much thinner, 2–3 μ, coarsely verrucose; aeciospores globoid or ellipsoid, 13–21 by 23–29 μ; wall colorless, closely and very finely verrucose, 1.5–2 μ thick.

ON BORAGINACEAE:

Anchusa officinalis L., Indiana; also in Europe.

II. Uredinia chiefly epiphyllous, numerous, oblong, 0.5–1 mm. long, early naked, reddish-brown becoming cinnamon-brown, pulverulent, ruptured epidermis conspicuous; urediniospores globoid or broadly ellipsoid, 18–24 by 21–29 μ; wall thin, 1–1.5 μ, golden-yellow or pale cinnamon-brown, finely and rather closely echinulate, the pores 6, scattered.

III. Telia chiefly hypophyllous, broadly oblong, 0.5–1 mm. long, long covered by the epidermis, blackish-brown, somewhat pulvinate, compound, surrounded by a brownish stroma; teliospores germinating at maturity, oblong-clavate or cylindric, 15–21 by 37–61 μ, truncate or rounded above, narrowed below, slightly or not constricted at septum; wall thin, about 1 μ, somewhat thickened above, 3–6 μ, dark chestnut-brown above, paler below, smooth; pedicel very short, dark chestnut-brown at the attachment.

ON POACEAE:
Secale cereale L., Arkansas, Delaware, Florida, Georgia, Illinois, Indiana, Iowa, Kansas, Louisiana, Michigan, Missouri, Nebraska, New Jersey, New York, North Carolina, Ohio, Oklahoma, Oregon, South Carolina, South Dakota, Tennessee, Texas, Virginia, Washington, West Virginia; Alberta.

TYPE LOCALITY: Europe, on *Anchusa* [*officinalis*].

DISTRIBUTION: Practically coextensive with the cultivation of rye, reported from New York to Michigan and southward to Florida and Texas, as well as from Washington and Oregon; also in Europe and other parts of the world. The aecia are comparatively rare.

ILLUSTRATIONS: Grove, Brit. Rust Fungi *f. 198;* McAlpine, Rusts Austr. *pl. 1, f. 1, 4, 9, pl. B, f. 9, 10;* Zeits. Pflanzenkr. 8: 335, *f. 3;* Beitr. Krypt. Schweiz 2^2:*f. 261;* Rostr. Plantep. Haandb. *f. 85–87.*

EXSICCATI: Barth. Fungi Columb. *3062, 3350, 4452, 4842;* Barth. N. Am. Ured. *223, 530, 1220, 1428, 2226, 2227;* Ellis & Ev. Fungi Columb. *1865;* D. Griff. W. Am. Fungi *21a:* Sydow, Ured. *1223.*

87. **Dicaeoma apocryptum** (Ellis & Tracy) Kuntze, Rev. Gen. 3^3: 467. 1898.

Aecidium Hydrophylli Peck, Bull. Buffalo Soc. Nat. Sci. 1: 68. 1873. Not *Dicaeoma Hydrophylli* Kuntze, 1898.
?Aecidium Phaceliae Peck, Bull. Torrey Club **11**: 50. 1884.
Puccinia apocrypta Ellis & Tracy, Jour. Myc. **6**: 76. 1890.
Aecidium Onosmodii Arth. Bull. Torrey Club **31**: 6. 1904.
Aecidium Mertensiae Arth. Bull. Torrey Club **31**: 6. 1904.
Aecidium Williamsii Ricker, Jour. Myc. **10**: 165. 1904.

O. Pycnia amphigenous or epiphyllous, in small circular groups, crowded, immersed, globoid in vertical section, 65–120 μ in diameter; ostiolar filaments 60–90 μ long.

I. Aecia hypophyllous, in crowded circular groups, up to 5 mm. or more across, cupulate, 0.4–0.5 mm. in diameter; peridium yellowish or colorless, the margin spreading and somewhat recurved, unevenly eroded; peridial cells oblong, 16–26 by 26–37 μ, the outer wall smooth, striate, thick, 5–9 μ, the inner wall thinner, 2–3 μ, moderately verrucose; aeciospores globoid, 16–26 by 21–29 μ; wall colorless, moderately thin, 1.5–2 μ, finely and closely verrucose.

ON HYDROPHYLLACEAE:
Eucrypta chrysanthemifolia (Benth.) Greene (*Ellisia chrysanthemifolia* Benth.), California.
Hydrophyllum albifrons A. Heller (*H. congestum* Wiegand), Idaho, Oregon.
Hydrophyllum appendiculatum Michx., Illinois.
Hydrophyllum capitatum Dougl., Colorado, Idaho, Montana, Oregon, Utah, Washington, Wyoming.
Hydrophyllum Fendleri (A. Gray) A. Heller, Colorado, Idaho, New Mexico, Wyoming.
Hydrophyllum occidentale A. Gray, California.
Hydrophyllum tenuipes A. Heller, Oregon, Washington.
Hydrophyllum virginianum L., Iowa, Minnesota, Nebraska, New York, North Dakota.
Hydrophyllum Watsoni (A. Gray) Rydb., Utah.
Nyctelea Nyctelea (L.) Britton (*Ellisia Nyctelea* L., *Macrocalyx Nyctelea* Kuntze), Iowa, Kansas, Nebraska, Oklahoma.
Phacelia alpina Rydb., Utah.
Phacelia californica Cham., California.
Phacelia circinata Jacq., California.
Phacelia distans Benth., California.
Phacelia heterophylla Pursh, Colorado, New Mexico, Oregon, Utah; British Columbia.
Phacelia hispida A. Gray, California.
Phacelia leucophylla Torr., Colorado, Idaho, Montana, Oregon.
Phacelia ramosissima Dougl., California.
Phacelia tanacetifolia Benth., California.

ON BORAGINACEAE:
Lappula coerulescens Rydb., Utah.
Lithospermum linearifolium Goldie (*L. angustifolium* Michx.), Nebraska, North Dakota, South Dakota.
Mertensia laevigata Piper, Idaho, Oregon.
Mertensia paniculata (Ait.) G. Don, Montana.
Myosotis virginica (L.) B.S.P. (*M. verna* Nutt.), Illinois, Missouri.
Onosmodium occidentale Mackenzie, Colorado, Kansas, Nebraska, North Dakota.

II. Uredinia hypophyllous, scattered, often causing a brownish discoloration of the host, oval or oblong, small, 0.1–0.3 mm. long, early naked, pulverulent, yellow, ruptured epidermis rather inconspicuous; paraphyses few, hyphoid or wanting; urediniospores ellipsoid or globoid, 13–21 by 19–25 μ; wall pale-yellow or pale-brown, 1–2 μ thick, moderately and rather finely echinulate, the pores scattered, 6–8.

III. Telia epiphyllous, scattered or occasionally somewhat confluent, oval or oblong, small, 0.1–0.5 mm. long, long covered by the epidermis, compact, dark chocolate-brown, surrounded by a layer of dark-brown hyphal stromata; teliospores cylindric, oblong or clavate, 13–23 by 35–55 μ, usually truncate above, somewhat narrowed below, not constricted at septum; wall chestnut-brown above, paler below, thin, 1 μ or less, thickened above, 3–5 μ, smooth; pedicel colorless or pale-brown, short, fragile.

The species is doubtless composed of a number of races, and may possibly include distinct species, but insufficient study leaves the matter uncertain for the present.

ON POACEAE:
Agropyron Smithii Rydb. (*A. occidentale* Scribn.), Colorado, North Dakota.
Agropyron tenerum Vasey, Colorado, Nebraska, North Dakota.
Agropyron violaceum (Hornem.) Lange (*A. biflorum* Am. Auct.), Colorado.
Elymus canadensis L., Kansas, Nebraska.
Elymus glaucus Buckl. (*E. americanus* Vasey & Scribn.), California, Colorado, Oregon, Utah, Washington.
Elymus virginicus L., Kansas.
Sitanion Hystrix (Nutt.) J. G. Smith (*S. brevifolium* J. G. Smith, *S. elymoides* Raf., *S. longifolium* J. G. Smith), Colorado.

TYPE LOCALITY: Cañon City, Colorado, on "*Asprella Hystrix*," error for *Sitanion Hystrix*.

DISTRIBUTION: Minnesota to British Columbia, and southward to Missouri and southern California.

EXSICCATI: Barth. Fungi Columb. *3001, 3401, 4101, 4604, 4839;* Barth. N. Am. Ured. *503, 705, 902, 1103, 1302, 1661, 1802;* Brenckle, Fungi Dak. *302, 343, 367a;* Clements, Crypt. Form. Colo. *317;* Ellis & Ev. Fungi Columb. *1859, 2102;* Ellis & Ev. N. Am. Fungi *1832, 2218;* Garrett, Fungi Utah *31, 35, 36, 77, 234;* Sydow, Ured. *1544, 1800.*

88. **Dicaeoma Clematidis** (DC.) Arth. Résult. Sci. Congr. Bot. Vienne 344. 1906.

Aecidium Clematitis DC. Fl. Fr. **2**: 243. 1805.
Aecidium Aquilegiae Pers. Ic. Pict. 58. 1806.
Aecidium Clematitis Schw. Schr. Nat. Ges. Leipzig **1**: 68. 1822.
Aecidium Actaeae Opiz, Böheims Gewächse 144, hyponym. 1823.
Caeoma vitalbatum Link, in Willd. Sp. Pl. 6^2: 54. 1825.
Caeoma (*Aecidium*) *clematitatum* Schw. Trans. Am. Phil. Soc. II. **4**: 293. 1832.
Caeoma (*Aecidium*) *cimicifugatum* Schw. Trans. Am. Phil. Soc. II. **4**: 293. 1832.
Aecidium (*Caeoma*) *cimicifugatum* Schw. T;ans. Am. Phil. Soc. II. **4**: 309. 1832.
Aecidium (*Caeoma*) *clematitatum* Schw. Trans. Am. Phil. Soc. II. **4**: 309. 1832.
Aecidium Actaeae Wallr. Fl. Crypt. Germ. 252. 1833.
Uredo Elymi Westend. Bull. Acad. Brux. 18^2: 405. 1851.
Puccinia Elymi Westend. Bull. Acad. Brux. 18^2: 408. 1851.
Puccinia triarticulata Berk. & Curt, Proc. Am. Acad. **4**: 126. 1862.
Puccinia tomipara Trel. Trans. Wis. Acad. Sci. **6**: 127. 1885.
Puccinia perplexans Plowr. Quart. Jour. Micr. Sci. **25**: 164. 1885.
Rostrupia Elymi Lagerh. Jour. de Bot. **3**: 188. 1889.
Rostrupia tomipara Lagerh. Jour. de Bot. **3**: 189. 1889.
Puccinia persistens Plowr. Brit. Ured. 180. 1889.
Puccinia Agrostidis Plowr. Gard. Chron. III. **8**: 139. 1890.
Puccinia Agropyri Ellis & Ev. Jour. Myc. **7**: 131. 1892.
Puccinia Aquilegiae Lagerh. Tromsö Mus. Aarsh. **17**: 47. 1895.
Puccinia Clematidis Lagerh. Tromsö Mus. Aarsh. **17**: 54. 1895.
Puccinia adspersa Dietel & Holway, Erythea **3**: 81. 1895.
Dicaeoma Agropyrum Kuntze, Rev. Gen. 3^3: 467. 1898.
Dicaeoma Elymi Kuntze, Rev. Gen. 3^3: 468. 1898.
Dicaeoma perplexans Kuntze, Rev. Gen. 3^3: 470. 1898.
Dicaeoma tomiparum Kuntze, Rev. Gen. 3^3: 470. 1898.
Puccinia triticina Eriksson, Ann. Sci. Nat. VIII. **9**: 270. 1899.
Puccinia agropyrina Eriksson, Ann. Sci. Nat. VIII. **9**: 273. 1899.
Puccinia Actaeae-Agropyri Ed. Fisch. Ber. Schweiz. Bot. Ges. **11**: 8. 1901.
Puccinia Panicullariae Arth. Bull. Torrey Club **28**: 663. 1901.
Puccinia Triticorum Speg. Anal. Mus. Nac. Buenos Aires III. **1**: 65. 1902.
Aecidium Delphinii Barth. Jour. Myc. 8: 173. 1902.
Aecidium Batesianum Barth.; Ellis & Ev. Fungi Columb. *1901.* 1904.
Aecidium occidentale Arth. Bull. Torrey Club **31**: 7. 1904.
Dicaeoma Panicullariae Arth. Résult. Sci. Congr. Bot. Vienne 344. 1906.
Puccinia cinerea Arth. Bull. Torrey Club **34**: 583. 1907.

Puccinia alternans Arth. Mycologia **1**: 248. 1909.
Puccinia obliterata Arth. Mycologia **1**: 250. 1909.
Puccinia Actaeae-Elymi Mayor, Ann. Myc. **9**: 361. 1911.
Dicaeoma triticinum Kern, Trans. Am. Micr. Soc. **32**: 64. 1913.
Puccinia wyomensis Arth. Bull. Torrey Club **45**:143. 1918.
Puccinia missouriensis Arth. Bull. Torrey Club **45**: 146, in part. 1918.

O. Pycnia epiphyllous, in crowded groups on thickened areas, opposite the aecia, honey-yellow, becoming brownish, globoid, 80–140 μ in diameter; ostiolar filaments 30–60 μ long.

I. Aecia hypophyllous and petiolicolous, in crowded circular or elongate groups, 1–5 mm. across, on more or less hypertrophied areas, sometimes forming conspicuous rounded galls, 5–20 mm. in diameter, cylindric, 0.1–0.3 mm. broad, up to 2 mm. high; peridium colorless, the margin slightly recurved and finely lacerate; peridial cells rhomboidal in longitudinal section, 20–26 by 20–35 μ, abutted, the outer wall thick, 6–12 μ, smooth, transversely striate, the inner wall thinner, 3–5 μ, moderately verrucose; aeciospores globoid or broadly ellipsoid, 15–23 by 18–28 μ; wall colorless, thin, 1–1.5 μ, finely and evenly verrucose.

ON RANUNCULACEAE:

Aconitum delphinifolium DC., Alaska.
Actaea alba (L.) Mill., Iowa, Michigan, Minnesota, New York, Ohio, Wisconsin; Ontario.
Actaea rubra (Ait.) Willd., New York.
Anemone canadensis L. (*A. pennsylvanica* L.), New York.
Anemone cylindrica A. Gray, Colorado, Iowa, Michigan, Minnesota, Missouri, Nebraska, New York, North Dakota, South Dakota, Wisconsin; British Columbia.
Anemone multifida Poir., Quebec.
Anemone Piperi Britton, Idaho, Washington.
Anemone quinquefolia L., Iowa, Wisconsin; Ontario.
Anemone riparia Fernald, Vermont; Quebec.
Anemone virginiana L., Indiana, Iowa, Minnesota, Wisconsin.
Aquilegia coerulea James, Colorado, New Mexico, Utah, Wyoming.
Aquilegia elegantula Greene, Colorado.
Aquilegia flavescens S. Wats., Idaho, Montana; Alberta.
Aquilegia formosa Fisch., Alaska, Idaho, Oregon, Washington; British Columbia.
Aquilegia laramiensis A. Nelson, Wyoming.
Aquilegia truncata Fisch. & Mey., California, Oregon.
Cimicifuga racemosa (L.) Nutt. (*Actaea racemosa* L.), New York, Ohio, Pennsylvania, Virginia; Ontario.
Clematis dioica L., Mexico (state).
Clematis Drummondii T. & G., Arizona, Texas.
Clematis grossa Benth., Mexico (state).
Clematis lasiantha Nutt., California.
Clematis ligusticifolia Nutt., Arizona, California, Colorado, Idaho, Montana, Nebraska, New Mexico, Oregon, South Dakota, Utah, Washington, Wyoming; Alberta, British Columbia.
Clematis pauciflora Nutt., California.
Clematis virginiana L., Connecticut, Indiana, Iowa, Maine, Maryland, Michigan, Missouri, Nebraska, New Hampshire, New York, North Carolina, Vermont.
Cyrtorrhyncha ranunculina Nutt. (*Ranunculus Nuttallii* A. Gray), Colorado.
Delphinium bicolor Nutt., Montana.
Delphinium cucullatum A. Nelson, Colorado.
Delphinium depauperatum Nutt., Oregon.
Delphinium geraniifolium Rydb., Colorado.
Delphinium Geyeri Greene, Colorado, Wyoming.
Delphinium glaucescens Rydb., Wyoming.
Delphinium Nelsoni Greene, Colorado, Idaho, Wyoming.
Delphinium reticulatum A. Nelson, Wyoming.
Delphinium robustum Rydb., Colorado.
Delphinium virescens Nutt. (*D. albescens* Rydb.), Nebraska.
Halerpestes Cymbalaria (Pursh) Greene (*Ranunculus Cymbalaria* Pursh, *Oxygraphis Cymbalaria* Prantl), Colorado, Montana, Nebraska, New Mexico, NewYork, North Dakota, South Dakota, Utah, Wyoming; British Columbia.
Isopyrum biternatum (Raf.) T. & G., Iowa.
Ranunculus acris L., Nova Scotia.
Ranunculus californicus Benth., California.
Ranunculus glaberrimus Hook. (*R. ellipticus* Greene), Colorado, Idaho, Montana, Washington.
Ranunculus occidentalis Nutt., Alaska.
Ranunculus sceleratus L., North Dakota.
Syndesmon thalictroides (L.) Hoffmg. (*Anemone thalictroides* L., *Thalictrum anemonoides* Michx.), Indiana, Missouri.
Thalictrum alpinum L., Colorado; Alberta.
Thalictrum dasycarpum Fisch. & Avé-Lall. (*T. purpurascens* of Britt. & Br. Illust. Fl. first ed.), Montana, Nebraska, North Dakota, Wisconsin, Wyoming; Manitoba.
Thalictrum dioicum L., Massachusetts, Michigan, Minnesota, Montana, New York, Pennsylvania, Vermont; Saskatchewan.
Thalictrum Fendleri Engelm., Arizona, California, Colorado, Idaho, Montana, New Mexico, Utah, Wyoming.

Thalictrum megacarpum Torr., Montana.
Thalictrum occidentale A. Gray, Idaho, Oregon, Utah, Washington, Wyoming; Alberta, British Columbia.
Thalictrum purpurascens L. (*T. polygamum* Muhl., *T. Cornuti* T. & G.), Colorado, Connecticut, Iowa, Nebraska, New York, North Dakota, South Dakota, Vermont, Wisconsin; Newfoundland, Saskatchewan.
Thalictrum sparsiflorum Turcz., Colorado, Wyoming.
Thalictrum thyrsoideum Greene, North Dakota.
Thalictrum venulosum Trel., Colorado, Montana; Alberta.
Viorna Fremontii (S. Wats.) A. Heller (*Clematis Fremontii* S. Wats.), Kansas.
Viorna hirsutissima (Pursh) A. Heller (*Clematis hirsutissima* Pursh, *C. Douglasii* Hook.), Colorado, Idaho, Montana, Washington, Wyoming.
Viorna Jonesii (Kuntze) Rydb. (*Clematis Jonesii* Kuntze), Colorado, Utah.
Viorna reticulata (Walt.) Small (*Clematis reticulata* Walt.), Texas.
Viorna Scottii (Porter) Rydb. (*Clematis Scottii* Porter), Colorado.
Viorna Viorna (L.) Small (*Clematis Viorna* L.), Iowa.

II. Uredinia amphigenous, numerous, scattered or crowded, oval, 0.3–1 mm. long, soon naked, pulverulent, light yellowish- or cinnamon-brown, ruptured epidermis noticeable; paraphyses usually rare or none, clavate or capitate, 14–23 by 40–56 μ, the wall colorless, 1–2 μ thick, smooth; urediniospores globoid, obovoid or ellipsoid, 16–24 by 19–32 μ; wall pale golden-yellow or pale cinnamon-brown, moderately thin, 1.5–2 μ, finely and moderately echinulate, the pores 6–8, scattered, usually distinct.

III. Telia chiefly hypophyllous and culmicolous, scattered or often crowded and confluent, oblong or linear, 0.3–2 mm. in length, compact, blackish, long covered by the epidermis, surrounded by a thin layer of dark-brown stromal hyphae; teliospores clavate, oblong or cylindric, 13–24 by 32–65 μ, usually truncate above, narrowed below, very slightly or not constricted at septum; wall dark chestnut-brown above, paler below, thin, about 1 μ, moderately thickened at apex, 3–7 μ, smooth; pedicel tinted, darkest at the attachment, short.

This species as here represented is composed of a large number of races of considerable fixity as shown by numerous cultures. The species can be roughly separated into two groups, each with its numerous races, one with smaller spores which appear to be often associated with aecia on *Actaea*, *Aconitum*, *Aquilegia* and *Thalictrum*, the other with larger spores often associated with aecia on *Clematis* and *Ranunculus*. The species morphologically is essentially like *Nigredo Alopecuri* (Seym.) Arth., except in the septation of the teliospores, and the two forms should eventually be united under one name.

ON POACEAE:
Aegilops ovata L. (*Triticum ovatum* Rasp.), Oregon.
Agropyron caninum (L.) Beauv., Montana; Alberta.
Agropyron dasystachyum (Hook.) Scribn.; Oregon, Saskatchewan.
Agropyron lanceolatum Scribn. & Smith, Colorado, Oregon.
Agropyron molle (Scribn. & Smith) Rydb., Colorado.
Agropyron pseudorepens Scribn. & Smith, Colorado, Idaho, Nebraska.
Agropyron repens (L.) Beauv., Delaware, Idaho, Indiana, Maine, Massachusetts, Michigan, New Jersey, New York, Ohio, Utah, Washington, Wisconsin; Alberta, Nova Scotia. Ontario.
Agropyron Smithii Rydb. (*A. occidentale* Scribn.), Colorado, Iowa, Kansas, Minnesota, Montana, Nebraska, New Mexico, North Dakota, Oklahoma, South Dakota, Utah.
Agropyron Smithii Palmeri (Scribn. & Smith) A. Heller (*A. Palmeri* Rydb.), Arizona.
Agropyron spicatum (Pursh) Scribn. & Smith (*A. divergens* Nees), Colorado, Montana, Oregon, Utah, Wyoming; Alberta.
Agropyron tenerum Vasey, Colorado, Iowa, Montana, Nebraska, New Mexico, North Dakota, South Dakota, Utah, Wisconsin, Wyoming; Manitoba,
Agropyron violaceum (Hornem.) Lange (*A. biflorum* Am. Auct.), Colorado; Alberta.
Alopecurus pratensis L., Nova Scotia.
Avena barbata Brot., California.
Bromus carinatus Hookerianus (Thurb.) Shear (*B. Hookerianus* Thurb.), California, Nebraska, Oregon, Washington; British Columbia.
Bromus ciliatus L., Colorado, Minnesota, New Hampshire, Wisconsin; Alberta, Manitoba, Nova Scotia, Ontario.
Bromus ciliatus laeviglumis Scribn., Wisconsin; Ontario.
Bromus commutatus Schrad. (*B. pratensis* Lam. not Ehrh.), Oregon.
Bromus exaltatus Bernh., Mexico (state).
Bromus eximius (Shear) Piper (*B. vulgaris eximius* Shear), California, Montana, Oregon.
Bromus grandis (Shear) Hitchc., Oregon.
Bromus hordeaceus L. (*B. mollis* L.), California, Oregon.
Bromus japonicus Thunb., Indiana.
Bromus latiglumis (Shear) Hitchc., Manitoba.
Bromus madritensis L., (cult.) Mississippi.
Bromus marginatus Nees (*B. breviaristatus* Buckl.), California, Colorado, Oregon, Utah, Wyoming.
Bromus pendulinus Sessé (*B. laciniatus* Beal), Mexico (state).
Bromus polyanthus Scribn., Washington.

Bromus Porteri (Coult.) Nash, Colorado, New Mexico.
Bromus Porteri lanatipes Shear (*B. lanatipes* Shear), Colorado.
Bromus Pumpellianus Scribn., Colorado; Alberta, Saskatchewan,
Bromus purgans L., Indiana, Iowa, Michigan, Missouri, Nebraska, North Dakota, West Virginia, Wisconsin; Ontario.
Bromus racemosus L. (*B. hordeaceus leptostachys* Beck.), Oregon.
Bromus Richardsonii Link, Colorado, New Mexico.
Bromus rubens L., California.
Bromus scoparius L., California.
Bromus secalinus L., Indiana, North Carolina, Oregon.
Bromus sitchensis Bong., Oregon, Washington.
Bromus sterilis L., Utah.
Bromus subvelutinus Shear, Washington.
Bromus tectorum L., Oregon.
Bromus villosus Forsk. (*B. maximus* Desf.), California, Oregon.
Bromus villosus Gussonei Aschers. & Graebn. (*B. maximus Gussonei* Parl.), California.
Elymus ambiguus Vasey & Scribn., Colorado, Idaho.
Elymus australis Scribn. & Ball, Arkansas.
Elymus brachystachys Scribn. & Ball, Colorado.
Elymus canadensis L., Colorado, Idaho, Iowa, Kansas, Montana, Nebraska, New Mexico, North Dakota, Wyoming.
Elymus condensatus Presl (*E. robustus* Scribn. & Smith), California, Colorado, Montana, Nebraska, New Mexico, Oregon, Washington, Wyoming.
Elymus glaucus Buckl. (*E. americanus* Vasey & Scribn.), California, Colorado, Montana, Oregon, Washington, Wyoming.
Elymus Howellii Scribn. & Merr., Alaska.
Elymus mollis Trin., Alaska.
Elymus striatus Willd., Colorado.
Elymus triticoides Buckl., Arizona, California, Colorado, New Mexico, Oregon, Utah.
Elymus vancouverensis Vasey, British Columbia.
Elymus virescens Piper, Alaska.
Elymus virginicus L., Iowa, Kansas, Nebraska, Oklahoma, Texas; Manitoba.
Festuca rubra L., British Columbia.
Hordeum jubatum L., Colorado, Illinois, Indiana, Iowa, Minnesota, Missouri, Nebraska, North Dakota, South Dakota, Wisconsin; Manitoba.
Hordeum vulgare L. (*H. sativum* Pers.), Texas.
Hystrix Hystrix (L.) Millsp. (*H. patula* Moench, *Asprella Hystrix* Willd.), Minnesota; Quebec.
Melica Geyeri Munro (*M. bromoides* A. Gray), California.
Panicularia grandis (S. Wats.) Nash (*P. americana* MacM., *Glyceria grandis* S. Wats.), Indiana, Iowa, Minnesota, South Dakota; Quebec.
Poa ampla Merrill, Oregon.
Poa arida Vasey (*P. pratericola* Rydb.), Colorado, Montana, Nebraska; Manitoba,
Poa Fendleriana (Steud.) Vasey, Utah.
Poa interior Rydb., Colorado.
Poa juncifolia Scribn., Colorado.
Poa longipedunculata Scribn., Colorado.
Poa nevadensis Vasey, Wyoming.
Poa pratensis L., Colorado.
Poa scabrella (Thurber) Benth., California.
Poa scabriuscula T. A. Williams, Colorado.
Poa Wheeleri Vasey, Utah.
Poa sp., South Dakota.
Puccinellia angustata (R. Br.) Rand & Redfield, Maine.
Puccinellia maritima (Huds.) Parl. (*Glyceria maritima* Wahl.), Nova Scotia.
Puccinellia Nuttalliana (Schultes) Hitchc. (*P. airoides* (Nutt.) Wats. & Coult., *Poa Nuttalliana* Schultes), Colorado, North Dakota, Wyoming.
Scolochloa festucacea (Willd.) Link, Montana, North Dakota.
Sitanion californicum J. G. Smith, Oregon.
Sitanion Hystrix (Nutt.) J. G. Smith (*S. brevifolium* J. G. Smith, *S. elymoides* Raf., *S. glabrum* J. G. Smith, *S. longifolium* J. G. Smith, *S. rigidum* J. G. Smith, *S. velutinum* Piper), California, Colorado, New Mexico, Oregon, Utah.
Sitanion jubatum J. G. Smith, Oregon.
Trisetum deyeuxioides (H.B.K.) Kunth, Jalisco; Guatemala.
Trisetum Fournieranum Hitchc. (*T. gracile* Fourn.), Hidalgo.
Trisetum montanum Vasey, Colorado.
Trisetum spicatum (L.) Richter (*T. toluccense* Kunth, *T. subspicatum* Beauv.), Colorado; Mexico (state).
Triticum aestivum L. (*T. sativum* Lam., *T. vulgare* Vill.), Alabama, Arkansas, Colorado, Delaware, Georgia, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maine, Maryland, Michigan, Minnesota, Missouri, Montana, Nebraska, New Jersey, New York, North Carolina, North Dakota, Ohio, Oklahoma, Oregon, Pennsylvania, South Carolina, South Dakota, Tennessee, Texas, Virginia, Washington, Wisconsin; Manitoba, Ontario; Mexico (state), Michoacan; Cuba.
Triticum compactum Host, California, Missouri.
Triticum dicoccoides Körn., Texas.
Triticum dicoccum Schr., Missouri, Texas.
Triticum durum Desf., Missouri, Nebraska.
Triticum monococcum L., Missouri.

COMPLETED VOLUME

9 : i–iv, 1–542. (Agaricales :) Polyporaceae (pars), Boletaceae, Agaricaceae (pars). Complete in 7 parts.

PARTS OF VOLUMES PREVIOUSLY PUBLISHED

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10[1]: 1–76. (Agaricales :) Agaricaceae (pars). **10**[2]: 77–144. Agaricaceae (pars). **10**[3]: 145–226. Agaricaceae (pars).

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16[1]: 1–88. Ophioglossales : Ophioglossaceae. Marattiales : Marattiaceae. Filicales : Osmundaceae, Ceratopteridaceae, Schizaeaceae, Gleicheniaceae, Cyatheaceae (pars).

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21[1]: 1–93. Chenopodiales: Chenopodiaceae. **21**[2]: 95–169. Amaranthaceae. **21**[3]: 171–254. Allioniaceae.

22[1]: 1–80. Rosales : Podostemonaceae, Crassulaceae, Penthoraceae, Parnassiaceae. **22**[2]: 81–192. Saxifragaceae, Hydrangeaceae, Cunoniaceae, Iteaceae, Pterostemonaceae, Hamamelidaceae, Altingiaceae, Phyllonomaceae. **22**[3]: 193–292. Grossulariaceae, Platanaceae, Crossosomataceae, Connaraceae, Calycanthaceae, Rosaceae (pars). **22**[4]: 293–388. Rosaceae (pars). **22**[5]: 389–480. Rosaceae (pars). **22**[6]: 481–560. Rosaceae (pars).

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